Date Distributed: 2/18/2020

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD SUBCOMMITTEE INSTALLATION

MINUTES

Meeting of January 15TH, 2020
San Diego, CA

These minutes are subject to approval and are for committee use only.
They are not to be duplicated or quoted for other than committee use.

The National Board of Boiler & Pressure Vessel Inspectors
1055 Crupper Avenue
Columbus, Ohio 43229-1183
Phone: (614)888-8320
FAX: (614)847-1828

1. **Call to Order**

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

2. **Introduction of Members and Visitors**

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

3. **Check for a Quorum**

- Gene Tompkins was present for Geoffrey Halley

With the attached roster and the above noted individual a quorum was established. There was a motion to approve the roster with the noted change. The motion was unanimously approved.

4. **Awards/Special Recognition**

None

5. **Announcements**

- The National Board hosted a reception for all committee members and visitors on Wednesday evening at 5:30 p.m. at The Smoking Gun.
- A breakfast was provided on Thursday morning for NBIC Committee members and visitors from 7 a.m. – 8 a.m. in the Le Fontainebleau room on the 2nd floor.
- A buffet lunch was provided on Thursday afternoon to NBIC Committee members and visitors from 11:30 a.m. to 12:30 p.m. in the Le Fontainebleau room on the 2nd floor.
- The SG was reminded that items need to be approved by Main Committee by the end of the July 2020 meeting in order to be included in the 2021 Edition of the NBIC.

6. **Adoption of the Agenda**

- Added new item 19-80 and 19-81

There was a motion to adopt the Agenda with the above noted additions. The motion was unanimously approved.

7. **Approval of the Minutes of July 17th, 2019 Meeting**

The minutes are available for review on the National Board website, www.nationalboard.org.

There was a motion to approve the Minutes of July 17th, 2019 as published. The motion was unanimously approved.

8. **Review of Rosters (Attachment Pages 1-4)**

- Mr. Paul Schuelke will retire from Weil-McLain in March of this year and therefore is resigning from membership on the SG & SC Installation effective the close of the January 2020 NBIC meetings.

a. Membership Nominations

- Mr. Patrick Jennings – AIA (Attachment Page)

Due to an in-balance of membership on the SC, Mr. Patrick Jennings – AIA was not voted on for membership at this time.

The SC took a vote on nominations to the SG Installation being Matt Downs – Manufacturer, Patrick Jennings - AIA and Joe Brockman – AIA. The vote was unanimously approved.

b. Membership Reappointments

The following subcommittee member terms are set to expire on 1/30/2020.

- Mr. Stanley Konopacki – User
- Mr. Rex Smith – AIA
- Mr. Eddie Wiggins – AIA
- Mr. Don Patten – Manufacturer

A vote will be taken in the MC meeting.

The SC took a vote on the membership reappointments to the SG Installation being Stanley Konopacki – User, Rex Smith – AIA and Todd Creacy – AIA. The vote was unanimously approved.

c. Officer Appointment

Mr. Don Patten's term as Vice Chair of the subcommittee is set to expire on 2/27/2020. This is the end of his second consecutive 3-year term as Vice Chair and he is therefore not eligible for reappointment as Vice Chair, unless no other member wishes to serve as Vice Chair.

The SC took a vote for a new officer appointment to Vice Chair of the SC. Mr. Eddie Wiggens was nominated and unanimously approved.

9. Open PRD Items Related to Installation

- NB15-0108B – Address pressure relief devices in new supplement on high temperature hot water boilers – A. Renaldo (PM)
- NB15-0305 – Create Guidelines for Installation of Overpressure Protection by System Design – D. Marek (PM)
- NB15-0308 – Create Guidelines for Installation of Pressure Relief Devices for Organic Fluid Vaporizers – T. Patel (PM)
- NB15-0315 – Review isolation valve requirements in Part 1, 4.5.6 and 5.3.6 – D. DeMichael (PM)
- NB16-0805 – Temperature ratings for discharge piping and fittings – A. Renaldo (PM)
- 17-115 – Complete rewrite of Part 4, Section 2 combining common requirements into a general requirements section for all pressure relief devices – A. Renaldo (PM)
- 17-119 – Part 4, 2.2.5 states that pressure setting may exceed 10% range. Clarify by how much – T. Patel (PM)
- 17-128 – Fix contradiction between Part 4, 2.4.1.6 a) and 2.4.4.3 regarding Y bases. – B. Nutter (PM)
- 18-73 – Update installation requirements for Thermal Fluid Heaters (Part 1, S5.7.6) – T. Patel (PM)
- 19-49 – Ensure shipping plugs for PRDs are removed during the installation process

10. Action Items

Item Number: NB11-1901	NBIC Location: Part 1	Attachment Pages 5-20

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. Richards, S. Konopacki, D. Patten and E. Wiggins

July Meeting Action: Proposal – R. Smith (PM) presented a summary and a cleaned up proposal. Discussions took place amongst the SC. There was a motion to approve the proposal to the MC for letter ballot. The motion was unanimously approved.

Update: This item was balloted to SC PRD at the request of the Main Committee. The ballot received a few comments which can be seen on Attachment Page 5.

Meeting Action: Progress Report – R. Smith discussed with the SC the 1 comment from D. Marek and how the group would want to address it. Rex will make changes based off of the SC's feedback and send it to FRP.

Item Number: NB16-0102	NBIC Location: Part 1	Attachment Page 21-24

General Description: Address post installation pressure testing

Subgroup: Installation

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

Meeting Action: Proposal – M. Wadkinson discussed this item proposal amongst the SG and SC. A break out session took place in the SG and a revised proposal was generated and presented addressing negative comments. There was a motion to approve the revised proposal to the MC. The motion was unanimously approved.

Item Number: 18-2	NBIC Location: Part 1	Attachment Page 25

General Description: Result of NB16-0101, add verbiage regarding commissioning fired boilers & fired pressure vessels with a calibrated combustion analyzer.

Subgroup: SG Installation

Task Group: E. Wiggins (PM), D. Patten, ~~P. Schuelke~~, M. Wadkinson, G. Tompkins and M. Washington

Meeting Action: Proposal – Added G. Tompkins and M. Washington and removed P. Schuelke on the TG. A break out session took place in the SG and a revised proposal was generated and presented. There was a motion to approve the revised proposal to the MC. The motion was unanimously approved.

Item Number: 18-57	NBIC Location: Part 1	Attachment Pages 26-38

General Description: Address the use & definition of the word inspector.

Subgroup: SG Installation

Task Group: ~~Brian Moore (PM),~~ P. Jennings (PM), R. Smith, ~~T. Griffin~~, and T. Creacy

Meeting Action: Progress Report – P. Jennings presented a summary document and held discussions amongst the SG. The TG continues to work on this item with intentions of having a proposal to present. R. Spiker, M. Washington and R. Adams have been added to the TG. B. Moore and T. Griffin were removed and P. Jennings was designated PM.

Item Number: 19-45	NBIC Location: Part 1, S1	Attachment Pages

General Description: Revisions to Yankee Dryer Supplement Wording in Part 1

Subgroup: SG Installation

Task Group: R. Spiker (PM), J. Jessick, and D. Patten

Explanation of Need: Various technical and editorial revisions for S1.1, S1.2, and S1.4.

Meeting Action: Progress Report - This item also affects Part 2 under item 19-46. Part 2 has separated these out into 3 separate items. V. Newton is the PM and continues to liaison between Part 1 and Part 2 so as to keep all informed. Venus presented an update to the SG.

Item Number: 19-49	NBIC Location: Part 1, 2.9 & 3.9	Attachment Page 39

General Description: Ensure shipping plugs for PRDs are removed during the installation process

Subgroup: SG Installation

Task Group: R. Smith (PM) and S. Konopacki

Explanation of Need: From the January 2019 main committee meeting, the discussion of PRD Item NB17-0401 led to the decision to open an item to address requirements to remove any shipping caps or plugs from pressure relief devices during the installation process.

Meeting Action: Proposal - A break out session took place in the SG and discussions were held amongst the SG. R. Smith reviewed our proposal with PRD of which comments were discussed and a revised proposal was generated, presented and discussed. There was a motion to approve the revised proposal to the MC. The motion was unanimously approved.

Note: CSD-1 Project – Task Group: D. Patten, S. Konopacki, G. Tompkins, M. Wadkinson, R. Austin, K. Watson and P. Schulke

Meeting Action: M. Wadkinson held discussions amongst the SG & SC to determine if action items needed to be opened to address Installation Requirements of CSD-1 to be put in Part I. A break out session was held and 17 items were opened along with TG's & PM's assigned. **Attachment Page 40**

11. New Items:

Item Number: 19-77	NBIC Location: Part 1, 1.4.5.1.1	Attachment Pages 41-43

General Description: NBIC Part 1, 1.4.5.1.1 Guide for installation report, items 6, 10, and 20

Subgroup: SG Installation

Task Group: ~~None~~ M. Downs (PM), M. Washington, R. Spiker, and J. Brockman

Explanation of Need: Cast aluminum boilers have been incorporated in ASME Section IV for a number of years now and it's time they be recognized in the NBIC. The installation report and guide were developed prior to cast aluminum boilers becoming an official part of ASME Section IV. It's suggested the guide item numbers and associated areas of the installation report be revised to incorporate cast aluminum boilers.

Meeting Action: Proposal – A TG was assigned of M. Downs (PM), M. Washington, R. Spiker, and J. Brockman. The SG & SC held discussions and completed a proposal. There was a motion to approve the proposal to the MC. The motion was unanimously approved.

Item Number: 19-80	NBIC Location: Part 1, 2.8.4	Attachment Pages 44-45

General Description: Conflicting statements in Part 1 and Part 2 about boiler controls. An IC Course student challenged an exam question that was written from Part 1 but the student found another possible answer in Part 2 with the "may be" language. Part 1 has a "shall be" requirement.
Note: The Part 1 reference is specific to power boilers while the Part 2 reference incorporates all boiler types [see 2.2.2 c) in Part 2]

Subgroup: SG Installation

Task Group: None

Explanation of Need: Requirements need to be consistent in Parts 1 and 2 to avoid confusion

Meeting Action: Close W/No Action – Luis Ponce presented a summary/background of this item. The SG discussed this item and determined that the code in Part 1 is clear and that there is no need for action in Part 1. There was a motion to close this item with no action. The motion was unanimously approved.

Item Number: 19-81	NBIC Location: Part 1, Table 3.7.9.1-b	Attachment Page 46

General Description: Correction to value in TABLE 3.7.9.1-b
The table in question is generated using the equation in 3.7.9.1 a) 2). The values in the table are all based on the same temperatures and pressures. The only thing that changes is the volume. The ratio of the Non-pressurized Type column value to the System Volume is 0.15 in all cases except the 100 gallon case which ends up being 0.18. Thus multiplying any system volume by 0.15 should give the third column value.

Subgroup: SG Installation

Task Group: ~~None~~ R. Smith (PM), M. Washington, T. Creacy, and R. Austin

Explanation of Need: There is only one incorrect value in the NBIC table and the rationale is in the background information. In addition, ASME Section IV, Table HG-709.2 has the correct value.

Meeting Action: Progress Report – A TG was assigned of R. Smith (PM), M. Washington, T. Creacy, and R. Austin. The SG held discussions and determined that further work is needed on this item. A proposal will be drafted and presented in the July 2020 meeting.

12. Future Meetings

- July 13th-16th, 2020 – Louisville, KY
- January 11th – 14th, 2020 – New Orleans,

13. Adjournment

A motion was made and unanimously approved to adjourn the meeting at 9:40 am

Respectfully submitted,

Jeanne Bock
NBIC Part 1 Secretary

NBIC Subcommittee Installation Attendance - 1/15/2020

First Last	Email	Company	Phone #	Signature	Attending Reception?
Paul Schuelke	pschuelke@weil-mccalain.com	Weil-McLain	219 879-6561		2
Melissa Wadkinson	Melissa.wadkinson@fulton-management.com	Fulton	315 298-7112		1
Don Patten	dpatten@baycityboiler.com	Bay City Boiler	510 786-3711		1
Jeanne Bock	jbock@nationalboard.org	The National Board	614 431-3233		1
Stanley Konopacki	Stanley.Konopacki@nrg.com	NRG	815 372-4740		
H. Michael Richards	Hmichaelrichards.pe@gmail.com	Southern Co.	205 706-0748		
Geoffrey Halley	ghalleysji@aol.com	ABMA	314 406-9591		
Matt Downs	mdowns@weil-mclain.com	Weil-McLain	219 879-6561		2
Edward Wiggins	Edward.Wiggins@bpcllcga.com	XL Insurance America	770 614-3111		
Rex Smith	RSmith@aiallc.org	Authorized Inspection Associates, LLC	281 751-1150		1
Todd Creacy	todd.creacy@zurichna.com	Zurich	817 403-4601		Yes
Randy Austin	rdaustin@lanl.gov	Los Alamos National Laboratory	505 667-6740		Yes
Gene Tompkins Alternate for G. Halley	gene @ abma	ABMA	920-289 0245		2
William Anderson	William.Anderson@msdh.ms.gov	State MS.	601-756 7892		Yes
Milton Washington	Milton.Washington@dol.nj.gov	State NJ DOB	(609) 292-2521		Yes
RODGER ADAMS	RODGER.ADAMS@ZURICHNA.COM	ZURICH	704 258-8073		YES
Patrick Jennings	patrick_jennings@hsb.com	HSB	860 930-4416		Yes
Joe Brockmeier	Ronald.brockm@FMglobal.com	FM Global	573 821-2217		YES
Tom Clark	thomas.g.clark@oregon.gov	State of Oregon BCD	971-209 -9082		Yes
Ken Watson	Kenneth.Watson@TUV.SUD.com	ARISE	501 590-6730		Yes

Patrick Jennings - Director of Legislative Affairs
Hartford Steam Boiler Inspection and Insurance Company

One State Street
PO Box 5024
Hartford, CT 06102
860 - 722 - 5582

Patrick_Jennings@hsb.com

SUMMARY

Over thirty years working with boilers in a wide range of job positions including; Technical Subject Matter Expert, Business Development, Boiler Design, Firing System Design, Boiler Design, R&D, field service.

The past eight years have been with Hartford Steam Boiler (HSB) with most of that time as a subject matter expert (boiler) supporting the Insurance and Jurisdictional aspects of HSB's equipment breakdown business.

EXPERIENCE

Hartford Steam Boiler

Director of Legislative Affairs December 2018 to Present.

Working for the Inspection Services group, I interface with subjects related to jurisdictional issues primarily the interface between the statutes, regulations and inspection services work instructions. This includes resolution of jurisdictional issues with the chiefs as needed.

Principal Engineer July 2011 to December 2018

Technical Subject Matter Expert for boilers in support of insurance and jurisdictional inspections business units. Provided technical support to underwriting by developing standards and performing desktop reviews; claims by training, inspection services by training and direct consultation. Support for claims and underwriting included direct consultation for atypical areas or events relating to boilers or energy.

Alstom Power (ABB, Combustion Engineering)

Director of Business Development April 2009 to July 2011
Manager of Business Development April 2008 to April 2009

Led a group of seven proposal managers and one proposal publisher with responsibility for obtaining financial objectives of order intake and as-sold gross and net margins. Responsible for the commercial and technical aspects of all proposals issued from the group. I worked closely with the sales and engineering organizations to perform market analysis, identify opportunities, develop appropriate scope proposals, conduct technical and commercial risk reviews and negotiate contracts.

Consulting Engineer, Performance Design, May 2006 to April 2008

As a Performance Design Engineer (PDE), the job entailed working on pressure part proposals and contract execution. This involved engineering analysis and material selections for both the proposal and contract

phase. All jobs proposed and executed finished under budget, on schedule and met all performance targets. Lead author of the boiler portion of the retrofits chapter in the Alstom Power textbook, *Clean Combustion Technologies.*

Supervisor of Proposal Engineering, Sept. 2004 to May 2006

Technically responsible for all Boiler Retrofit (Windsor) proposals issued. The requirement was to ensure that all proposals have clearly identified scope of supply and performance conditions that support performance guarantees. Identify risk areas and potential mitigation strategies.

Business Development Manager, March 1999 to Sept. 2004

Responsible for capturing NOx reduction projects and related firing systems products from utility and industrial companies. As a Business Development Manager I obtained $65 Million in direct contracts with higher than average gross margins for the business unit. These contracts resulted in significant pull through work for construction, technical services and contract extras.

Principal Firing Systems Engineer, June 1994 to March 1999

Primarily responsible for the technical direction of proposals for Low NOx firing system projects that meet customer expectations and achieve guaranteed performance. Supported proposals for standard product lines and three first of a kind firing systems with responsibility for the safe design and project execution.

R&D Firing Systems Engineer, March 1990 to June 1994

Primarily responsible for proposing and executing firing system developmental projects in direct support of business unit requirements and government contracts with values up to four million dollars. Received a patent for technology developed.

Test Engineer, July 1986 to March 1990

As a field services test engineer for technical services working on utility boilers job responsibilities included; developing test plans, identifying resource requirements and executing test programs. I also supported NDE testing on the first Combustion Engineering CFB boiler.

EDUCATION

North Carolina State University, Raleigh NC - B.S. Mechanical Engineering – May 1986

PATENTS

US Patent 5,315,939 – One of the Top 100 Inventions of 1994; Popular Science Magazine

TECHNICAL PAPERS / WRITING (Selected)

Jennings, P; Ashman, J; Dejung, S; Gebert, T; Kolbe, C; Park, H; Popovic, C; Von Roth, D; Shepherd, M (2016). IMIA Working Group Paper 95(16) Supercritical Boilers, *49th Annual IMIA Conference*, Doha, Qatar.

Lead author on the Retrofits chapter in the Alstom Power *Clean Combustion Technologies* (2009) textbook.

Jennings, P. (2004). Alstom's Low NOx Firing Experience on Western Fuels. *Western Fuels Symposium.* Billings, MT.

Jennings, P. (2002). Low NOx Firing Systems and PRB Fuel; Achieving as low as 0.12 LB NOx/MBtu. *Institute of Clean Air Companies, Forum '02.* Houston, TX.

Gessner, T., Hoh, R., Ray, B., Dorazio, T., Sikorski, K., & Jennings, P. (1999). NOx Emissions Retrofit at Reliant Energy, W.A. Parish Generating Station, Unit 7: Achieving 0.15 lb/MBtu. *ASME International Joint Power Generation Conference.* San Francisco, CA.

Gessner, T., Hoh, R., Ray, B., Jennings, P., & Rebula, E. (1999). Results from Reliant Energy, W.A. Parish 7; Achieving < 0.15 lb/MBtu . *EPA-EPRI-DOE Combined Utility Air Pollutant Control Symposium: The Mega Symposium* . Atlanta, GA.

Jennings, P. (1993). Development and Testing of a High Efficiency Advanded Coal Combustor; Industrial Boiler Retrofit. *Proc. 11th International Pittsburgh Coal Conference.* Pittsburgh, PA.

Darroch, M., LaFlesh, R., Hart, D., & Jennings, P. (1991). "In-Furnace Low NOx Solutions for Wall Fired Boilers." *Spring Meeting, AFRC* . Hartford, CT.

NB11-1901

SUPPLEMENT X
INSTALLATION OF HIGH PRESSURE COMPOSITE PRESSURE VESSELS

SX.1 SCOPE

This supplement provides requirements for the installation of high-pressure composite pressure vessels. This supplement is applicable to pressure vessels with an 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

SX.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.

SX.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. The vessel owner shall document the vessel pressure and pipe diameters used as a basis for compliance with NFPA 2 location requirements.

SX.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.

SX.5 MECHANICAL CONNECTIONS

Mechanical connections shall comply with pressure vessel manufacturer’s instructions, and with requirements of the Jurisdiction. 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.

SX.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 0.0550in (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.

SX.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 shall 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 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, insects, rainwater, or other materials.

g) When a single pressure relieving device is used, it shall be set to operate at a pressure not exceeding the MAWP of the vessel. When the required capacity is provided in more than one pressure relieving device, only one device need be set at or below the MAWP, and the additional device(s) may be set to open at higher pressures but in no case at a pressure higher than 105% of the MAWP. The requirements of RR-130 of ASME Section X shall also apply.

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 greater than 220°F.

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

SX.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 manufacturer, owner, user, qualified engineer, 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

d) Fire and heat detection/suppression provisions shall comply with the requirements of the Jurisdiction 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. Protection from wind, seismic events 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 as required by the Jurisdiction as addressing all of the above, and any requirements of the Jurisdiction, prior to first use. This verification shall be posted in a conspicuous location near the vessel and, when required, on file with the

Jurisdiction. Certificates shall be updated as required by mandated subsequent inspections.

8) Piping installation shall comply with ASME B31.12 or NFPA 2.

9) The vessels shall be electrically bonded and grounded per NFPA 55.

SX.9 LADDERS AND RUNWAYS

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

Committee Member:	Daniel Marek	**Vote Date:**	2019-09-03	**Vote:**	Disapproved	**Uploads:**	

Member Comment:

SX.1: Does the Scope of this supplement limit the media stored in the composite vessel? Can the vessels be used in both gas and liquid applications?\

SX.4: If multiple media are allowed, should not piping load criteria be to the applicable Code, not limited to ASME B31.12 which applies to Hydrogen systems only.

SX.7 d): If the vessel is used for the storage of air or water, can a relief device with lifting lever be used?

SX.7 e): Are there any restrictions on location and size of openings? Minimum net flow area of opening?

SX.7 f): Built up backpressure requirement?

SX.7 g): Can the set point exceed MAWP when multiple relief devices are installed if allowed in the original Code of construction? Can the set point exceed MAWP when relief devices meant for fire protection only if allowed in the original Code of construction?

SX.7 h): Should not the capacity be sufficient to prevent overpressure in excess of that allowable by the original Code of construction?

Committee Member:	Thakor Patel	**Vote Date:**	2019-09-09	**Vote:**	Approved	**Uploads:**	

Member Comment:

I support Adam's comments and use the word MAWP instead of design pressure. The word "MAWP" used in the construction standard. Also specify the permissible overpressure for in the proposal.

Committee Member:	Adam Renaldo	**Vote Date:**	2019-08-12	**Vote:**	Approved	**Uploads:**	

Member Comment:

Change SX.7gCurrently:"g) The pressure relief device(s) shall be set at a pressure not exceeding the MAWP of the vessel. "Change to: "g) At least one pressure relief device shall be set at a pressure not exceeding the MAWP of the vessel. Additional pressure relief devices shall be set no higher than 105% of the MAWP of the vessel." The proposed edit will bring SX.7g into compliance with ASME Section VIII, Div 3, KR-162."KR-162 MULTIPLE PRESSURE RELIEF DEVICES If the required discharging capacity is supplied by more than one device, only one need be set to operate at a pressure not exceeding the design pressure of the vessel. The additional device or devices may be set at a higher pressure but not to exceed 105% of the design pressure of the vessel. The requirements of KR-150 shall also apply."

PM Reply:

I agree with the suggestion, but I think ASME Section X is the more appropriate wording; it's very close to the VIII-3 wording. RR-130 covers the same items as KR-150. I've made the change to the document and added it here as R2 for your review.

"When a single pressure relieving device is used, it shall
be set to operate at a pressure not exceeding the design
pressure of the vessel. When the required capacity is
provided in more than one pressure relieving device,
only one device need be set at or below the design pressure,
and the additional devices may be set to open at
higher pressures but in no case at a pressure higher
than 105% of the design pressure. The requirements of RR-130 shall also apply."

NB11-1901

SUPPLEMENT X
INSTALLATION OF HIGH PRESSURE COMPOSITE PRESSURE VESSELS

SX.1 SCOPE

This supplement provides requirements for the installation of high-pressure composite pressure vessels. This supplement is applicable to pressure vessels with an 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

SX.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.

SX.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. The vessel owner shall document the vessel pressure and pipe diameters used as a basis for compliance with NFPA 2 location requirements.

SX.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.

SX.5 MECHANICAL CONNECTIONS

Mechanical connections shall comply with pressure vessel manufacturer's instructions, and with requirements of the Jurisdiction. 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.

SX.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 0.0550in (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.

SX.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 shall 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 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, insects, rainwater, 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 greater than 220°F.

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

SX.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 manufacturer, owner, user, qualified engineer, 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

d) Fire and heat detection/suppression provisions shall comply with the requirements of the Jurisdiction 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.

Protection from wind, seismic events 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 as required by the Jurisdiction as addressing all of the above, and any requirements of the Jurisdiction, prior to first use. This verification shall be posted in a conspicuous location near the vessel and, when required, on file with the Jurisdiction. Certificates shall be updated as required by mandated subsequent inspections.

8) Piping installation shall comply with ASME B31.12 or NFPA 2.

9) The vessels shall be electrically bonded and grounded per NFPA 55.

SX.9 LADDERS AND RUNWAYS

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

NB16-0102

Action Item Request Form

2019 Main Committee Letter Ballot Comments:

Committee Member:	Joel Amato	**Vote Date:**	2019-07-31	**Vote:**	Disapproved	**Uploads:**	
Member Comment:	I disapprove this ballot because I believe the operational test on the completed installation must be witnessed by an inspector.						

Committee Member:	James Pillow	**Vote Date:**	2019-07-31	**Vote:**	Abstention	**Uploads:**	
Member Comment:	I'm sure that those that heard the discussions on this item are not confused, but 1.6.10c) is confusing to me. What boiler/PV component pressure test is not documented on the MDR when 1.6.10a) requires a pressure test of the COMPLETED boiler/PV?						

8.2 CODE REVISIONS OR ADDITIONS

Request for Code revisions or additions shall provide the following:

Existing Text:

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.

2.10.4 SYSTEM TESTING

Prior to final acceptance, an operational test shall be performed on the complete installation. The test data shall be recorded and the data made available to the jurisdictional authorities as evidence that the installation complies with the provisions of the governing code(s) of construction. This operational test may be used as the final acceptance of the unit.

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.

4.7.6 TESTING AND ACCEPTANCE

Testing and acceptance shall be in accordance with NBIC Part 1, 4.6

NB16-0102

b) Statement of Need

NB10-1201 Covered reformatting multiple items. Pressure Testing was inconsistent between the three sections and really needs to be addressed

c) Background Information

Consolidation of Testing and Final Acceptance to Section 1 General.

Proposed Wording:

1.6.10 TESTING AND FINAL ACCEPTANCE

~~Boilers, heaters, or pressure vessels may not be placed into service until its installation has been inspected and accepted by the appropriate jurisdictional authorities.~~

a) The completed boiler/ pressure vessel shall be pressure tested in the shop and/or in the field in accordance with the original code of construction and documented on the appropriate Manufacturer's Data Report.

b) 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. Prior to making the final closure the installer shall inspect the interior of the vessel and its appurtenances for the presence of foreign debris, if present it shall be removed.

c) Subject to the jurisdictional requirements, a leak test may be performed on any components whose pressure test is not documented under the items' Manufacturer's Data Report. This leak test should not exceed 90% of the lowest pressure relief device setpoint. The test data shall be recorded, and the data made available as required.

d) Prior to final acceptance, an operational test shall be performed on the completed installation. The test shall include operating controls, limit controls and safety devices and witnessed as required by the Jurisdiction. The test data shall be recorded, and the data made available to the Jurisdictional Authorities as evidence that the installation complies with provisions of the governing code(s) of construction.

2.10.2 PRESSURE TEST

See NBIC Part 1, Section 1.6.10, *TESTING AND FINAL ACCEPTANCE*

~~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.~~

2.10.4 SYSTEM TESTING

See NBIC Part 1, Section 1.6.10, *TESTING AND FINAL ACCEPTANCE*

~~Prior to final acceptance, an operational test shall be performed on the complete installation. The test data shall be recorded and the data made available to the jurisdictional authorities as evidence that the installation complies with the provisions of the governing code(s) of construction. This operational test may be used as the final acceptance of the unit.~~

3.10.1 PRESSURE TEST

See NBIC Part 1, Section 1.6.10, *TESTING AND FINAL ACCEPTANCE*

~~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

See NBIC Part 1, Section 1.6.10, *TESTING AND FINAL 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.~~

4.7.6 TESTING AND ACCEPTANCE

See NBIC Part 1, Section 1.6.10, *TESTING AND FINAL ACCEPTANCE*

~~Testing and acceptance shall be in accordance with NBIC Part 1, 4.6~~

Old wording that has been submitted as a letter ballot to the MC:

a) The completed boiler/ pressure vessel shall be pressure tested in the shop and/or in the field in accordance with the original code of construction.

b) 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. Prior to making the final closure. 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.

c) Subject to the jurisdictional requirements, Prior to final acceptance, an operational pressure test, with the approval of the jurisdiction if required, shall may be performed on any components whose pressure test is not documented under the items' Manufacturer's Data Report. This pressure test should not exceed 90% of the lowest pressure relief device setpoint. The test data shall be recorded and the data made available as required. This operational test may be used as the final acceptance of the unit.

Comments for Ballot: NB16-01-02	
Welch,Paul voted: Approve 10/19/2016 1:50:39 PM	I recommend approval with a minor change to the proposed wording in para b. second sentence to read: Prior to final acceptance, an operational test, with the approval of the Jurisdiction, shall be performed...
Pillow,James voted: Approve 10/6/2016 8:00:39 AM	I approve the proposal, but suggest a minor editorial change in last sentence of first paragraph as follows. Prior to making the final closures, the installer shall inspect the interior of the vessel and its appurtenances where possible for the presence of foreign debris.
Webb,Michael voted: Disapprove 10/5/2016 3:01:27 PM	At this time, I will vote to "disapprove" this item. My understanding of this action item was to; generally consolidate the pressure testing requirements of the various Part 1, Sections into a more general practice to be described in Part 1, Section 1-General Guidelines. In my read whether intended or my misunderstanding, the product of the SC-Installation effort may have offered the ASME code-required pressure testing to be circumvented as presented in the SC-proposed paragraph "b)". To add, I would propose for consideration the item as presented in the attachment or otherwise presented be inserted as: Part 1, Section 1, 1.4.1 b) with the current 1.4.1 b) re-introduced to become 1.4.1 c). As a note to the attachment: the text in red represents the text implying the operational test may satisfy final acceptance of the unit.–M. Webb, 10-5-16 Reference Document: NB16-0102-letter ballot Part 1 Section 1 G. Guidelines proposed 1.4.1. b. 10-5-16.pdf
Troutt,Robby voted: Disapprove 10/5/2016 8:09:44 AM	My disapproval is based on the lack of reference to a jurisdictional inspection prior to the operational test in paragraph (b). Some jurisdictions do not allow an operational test prior to the initial inspection.
Sekely,Jim voted: Approve 10/3/2016 1:07:21 PM	1.?? b): Change who's to whose

Action Item Request Form

Item Number:	18-2 E. Wiggins 1-10-18
General Description:	Add verbiage regarding commissioning fired boilers & fired pressure vessels with a calibrated combustion analyzer.
Subgroup:	SG Installation

Statement of Need

Task Group: E. Wiggins (PM), D. Patten, P. Schuelke, M. Wadkinson

With the addition of requiring Carbon Monoxide (CO) detector(s) / alarm(s) the concern that the combustion equipment needs to be commissioned and potentially maintained of air/fuel ratios to meet emission requirements / limits of the manufacturer and as imposed by EPA, Area Air Quality Management District and Jurisdiction, as required.

c) Background Information

Provide background information to support the revision or addition, including any data or changes in technology that form the basis for the request that will allow the Committee to adequately evaluate the proposed revision or addition. Sketches, tables, figures, and graphs should be submitted as appropriate.

When applicable, identify any pertinent paragraph in the Code that would be affected by the revision or addition and identify paragraphs in the Code that reference the paragraphs that are to be revised or added.

Task Group Notes:

7-17-18 TG – (EW, DP, MW, GH, Matt Downs & Bryan Ahee) reviewed the action item and following verbiage is going to be proposed:

~~1.X.X or~~ Part of 1.6.~~9~~ 10.x Testing and Final Acceptance

All fuel fired equipment combustion air / fuel ratios shall be adjusted and values documented during commissioning to meet emission requirements / limits of the manufacturer and Jurisdiction, as required.

Location and Usage – Inspector – inspector	Comments
1.1 Scope Middle of main paragraph. "Otherwise the requirements specified in NBIC part 1 provide guidance for installers, contractor, owners, *inspectors*, and jurisdictions to ensure safe and satisfactory installation of specified pressure-retaining items.	The first part of the paragraph states that the owner-user is responsible for ensuring that the installation meet all the requirements of the Jurisdiction at the point of installation including licensing, registration, or certification of those performing installations. Inspector is little i. Could mean jurisdictional or other.
1.4.1 Responsibility b) The National Board Commissioned *Inspector* providing inservice inspection for the facility in which the pressure-retaining item is installed have 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 alteration to pressure-retaining item, 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 service 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.	Inservice inspector responsibilities under Part 1. Capital I IS endorsement Little I, but references a commission. This should be capitalized
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.*	Capital Inspector so a Commissioned inspector Inservice or shop? (IS vs. R) Do we want to differentiate?

4.6 testing and acceptance (pressure vessels) b. The completed pressure vessel shall be pressure tested in the shop or in the field in accordance to 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….	Is this the AI? It is a commissioned Inspector so Capital I is appropriate, but which one?
Supplement 1 Installation of Yankee Dryers **S1.2 ASSESSMENT OF INSTALLATION** a. The *Inspector* verifies that the owner or user is properly controlling the operating conditions of the dryer. The *Inspector* does this by reviewing the owners comprehensive assessments of the complete installation. f. To maintain produce quality, the dryer surface is periodically refurbished by grinding…. The manufacturer, or another qualified source acceptable to the *Inspector*, instead provided a series of curves that graphically defines these maximum allowable operating parameters…. h. If nonstandard load events (incidents) have occurred during installation, then the *Inspector* should ensure that an appropriate assessment of the structural integrity….	Inservice Inspector Capital I and context fits.
Supplement 2 - Pressure relief valves on the low-pressure side of steam pressure reducing valves **S2.2 PRESSURE RELIEF VALVE CAPACITY** b. By using the formula in NBIC Part 1, S2.3, *Inspectors* may calculate the required relieving capacities of the pressure relief valve(s) installed on the low-pressure side of the reducing valve.	Assume meant for inservice Capital I and context.
Supplement 5 Installation of thermal fluid heaters **S5.8.2 PRESSURE TEST** Prior to initial operation, the completed thermal fluid heater system, including pressure piping, pumps, stop valves, etc. shall be pressure tested in accordance with the manufacturer's recommendations. Hydrostatic testing of the system is not recommended due to possible contamination of the system. All pressure testing should be witnessed by an *Inspector*.	Prior to operation. Capitol I Is this an in-service or shop as it is the system test. AIA typically doesn't test completed systems but in-service don't inspect prior to operation.
Definitions Confined space - … the *Inspector* is a cautioned of the need to comply with…	Any commissioned Inspector.

Dutchman - Generally limited to tube or pipe cross-section replacement. … meeting the service requirements and installation procedures acceptable to the *Inspector*….	Dutchman are repair – shop/repair Not in-service.
National Board Commissioned *Inspector* - An individual who holds a valid and current National Board Commission.	Definition – No distinction between in-service and AIA
Owner-user *Inspector* - An individual who holds a valid and current National Board Commission.	Same definition as an NBIC commissioned inspector. Should we add to the definition? " and is employed by an Owner or User who has an Owner-User Inspection Organization?
Interpretations Multiple references to *Inspector.*	Most appear to reference repairs. Some are older references and difficult to ascertain from the Subject.
Location and Usage **Inspection - inspection**	
1.4 CERTIFICATION, INSPECTION, AND JURISDICTIONAL REQUIREMENTS 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	Inspection – little i but by context should be I. Also should be I, not i.

required by the Jurisdiction.	
1.4.2 EQUIPMENT CERTIFICATION b) Package boilers having external piping disassembled and shipped with the boiler shall have a method for traceability of the disassembled piping that can be verified at the time of installation and inspection. The manufacturer of the package boiler is responsible for determining a method of traceability.	Little i, but unclear.
1.4.4 INSPECTION All boilers, pressure vessels, piping, and other pressure-retaining items shall be inspected and tested after installation and prior to commencing operation. 1.4.5 BOILER INSTALLATION REPORT a) Upon completion, inspection, testing, and acceptance of the installation, the installer shall complete and certify the Boiler Installation Report (I-1) for all power boilers, hot-water heating boilers, steam-heating boilers, hot-water supply boilers, and potable water heaters.	Little i, the installation report is by the installer. Not an Inspector reference.
1.6.4 LADDERS AND RUNWAYS a) All walkways, runways, and platforms shall be: 1) of metal construction or equivalent material; 2) provided between or over the top of boilers, heaters, or vessels that are more than 8 ft. (2.4 m) above the operating floor to afford accessibility for normal operation, maintenance, and inspection;	Little i. Reference to generic inspection activities that may include big I Inspection. (“Generic i” in the following cases)
2.3.3 CLEARANCES	

a) Boiler installations shall allow for normal operation, maintenance, and inspections. There shall be at least 36 in. (915 mm) of clearance on each side of the boiler to enable access for maintenance and/or inspection activities. Boilers operated in battery shall not be installed closer than 48 in. (1220 mm) from each other. The front or rear of any boiler shall not be located nearer than 36 in. (915 mm) from any wall or structure. e) Boilers with a bottom opening used for inspection or maintenance shall have at least 12 in. (305 mm) of unobstructed clearance.	Generic i.
2.7.5 BLOWOFF q) Where necessary to install a blowoff tank underground, it shall be enclosed in a concrete or brick pit with a removable cover so that inspection of the entire shell and heads of the tank can be made.	Generic i.
2.10 TESTING AND ACCEPTANCE 2.10.1 GENERAL a) Care shall be exercised during installation to prevent loose weld material, welding rods, small tools, and miscellaneous scrap metal from getting into the boiler. Where possible, an inspection of the interior of the boiler and its appurtenances shall be made for the presence of foreign debris prior to making the final closure.	Generic i.
2.10.6 BOILER INSTALLATION REPORT a) Upon completion, inspection, and acceptance of the installation, the installer shall complete and certify the Boiler Installation Report I-1. See NBIC Part 1, 1.4.5.1.	Not an Inspector. Little i. ?

3.3.4 CLEARANCES c) Heating boilers shall be located so that adequate space is provided for proper operation, maintenance, and inspection of equipment and appurtenances, which shall include the removal of tubes if applicable.	Generic i.
3.7.4 FEEDWATER, MAKEUP WATER, AND WATER SUPPLY a) Steam Boilers Feedwater or water treatment shall be introduced into a boiler through the return piping system. Alternatively, feedwater or water treatment shall be introduced through an independent connection. The water flow from the independent connection shall not discharge directly against parts of the boiler exposed to direct radiant heat from the fire. Feedwater or water treatment shall not be introduced through openings or connections provided for inspection or cleaning, safety valve, water column, water-gage glass, or pressure gage. The feedwater pipe shall be provided with a check valve, or a backflow preventer containing a check valve, near the boiler and a stop valve or cock between the check valve and the boiler, or between the check valve and the return pipe system. b) Hot-Water Boilers Makeup water may be introduced into a boiler through the piping system or through an independent connection. The water flow from the independent connection shall not discharge directly against parts of the boiler exposed to direct radiant heat from the fire. Makeup water shall not be introduced through openings or connections provided exclusively for inspection or cleaning, safety relief valve, pressure gage, or temperature gage. The makeup water pipe shall be provided with a check valve, or a backflow preventer containing a check valve, near the boiler and a stop valve or cock between the check valve and the boiler, or between the check valve and the piping system.	Generic i

3.10.3 BOILER INSTALLATION REPORT a) Upon completion, inspection, and acceptance of the installation, the installer shall complete and certify the Boiler Installation Report I-1. See NBIC Part 1, 1.4.5.1. 4.3.2 CLEARANCES a) All pressure vessel installations must allow sufficient clearance for normal operation, maintenance, and inspection (internal and external).	Not the in-service inspector prior to first "inspection"
4.5.6 INSTALLATION AND DISCHARGE PIPING REQUIREMENTS e) There shall be no intervening stop valves…except under the following conditions: 2) Upon specific acceptance of the Jurisdiction, when necessary for the continuous operation of processing equipment of such a complex nature that shutdown of any part is not feasible, a full area stop valve between a pressure vessel and its pressure relief device may be provided for inspection and repair purposes only. This stop valve shall be arranged so that it can be locked or sealed open, and it shall not be closed except by an authorized person who shall remain stationed there during that period of operation while the valve remains closed. The valve shall be locked or sealed in the open position before the authorized person leaves the station. 3) A full area stop valve may also be placed on the discharge side of a pressure relief device when its discharge is connected to a common header for pressure relief devices to prevent discharges from these other devices from flowing back to the first device during inspection and repair. This stop valve shall be arranged so that it can be locked or sealed open, and it shall not be closed except	Generic i.

by an authorized person who shall remain stationed there during that period of operation while the valve remains closed. The valve shall be locked and sealed in the open position before the authorized person leaves the station. This valve shall only be used when a stop valve on the inlet side of the pressure relief device is first closed. h) Pressure relief devices shall be installed so they are readily accessible for inspection, repair, or replacement.	
4.7.2 CLEARANCE AND ACCEPTABILITY a) The required nameplate (marking or stamping) should be exposed and accessible. b) The openings when required should be accessible to allow for entry for inspection and maintenance.	Generic i.
5.3.6 INLET AND DISCHARGE PIPING REQUIREMENTS e) There shall be no intervening stop valves … except under the following conditions: 2) Upon specific acceptance of the Jurisdiction, when necessary for the continuous operation of processing equipment of such a complex nature that shutdown of any part is not feasible, a full area stop valve between a piping system and its pressure relief device may be provided for inspection and repair purposes only. This stop valve shall be arranged so that it can be locked or sealed open and it shall not be closed except by an authorized person who shall remain stationed there during that period of operation while the valve remains closed. The valve shall be locked or sealed in the open position before the authorized person leaves the station; 3) A full area stop valve may be placed on the discharge side of a pressure relief device when its discharge is connected to a common header for pressure relief devices to prevent discharges from	Generic i.

these other devices from flowing back to the first device during inspection and repair. This stop valve shall be arranged so that it can be locked or sealed open, and it shall not be closed except by an authorized person who shall remain stationed there during that period of operation while the valve remains closed. The valve shall be locked or sealed in the open position before the authorized person leaves the station. This valve shall only be used when a stop valve on the inlet side of the pressure relief device is first closed; or i) Pressure relief devices shall be installed so they are accessible for inspection, repair, or replacement. These stop valves shall be so constructed or positively controlled that the closing of the maximum number of block valves at one time will not reduce the pressure relieving capacity below the required relieving capacity.	
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.	As it is required by the code of construction, should this be a capitol I? Why both examinations and inspections.
S3.2.1 GENERAL REQUIREMENTS (ENCLOSED AND UNENCLOSED AREAS) a) LCDSVs shall not be located within 10 feet (3,050 mm) of elevators, unprotected platform ledges, or other areas where falling would result in dropping distances exceeding half the container height. b) LCDSVs shall be installed with sufficient clearance for filling, operation, maintenance, inspection, and replacement.	Generic i
S5.3.4 CLEARANCES	Generic i

a) Thermal fluid heater installations shall allow for normal operation, maintenance, and inspections. There shall be at least 18 in. (460 mm) of clearance on each side of the thermal fluid heater to enable access for maintenance and/or inspection activities. Thermal fluid heaters operated in battery shall not be installed closer than 18 in. (460 mm) from each other. The front or rear of any thermal fluid heater shall not be located nearer than 36 in. (915 mm) from any wall or structure. c) Heaters with a bottom opening used for inspection or maintenance shall have at least 18 in. (460 mm) of unobstructed clearance.	
S5.8.1 GENERAL a) Care shall be exercised during installation to prevent loose weld material, welding rods, small tools, and miscellaneous scrap metal from getting into the thermal fluid system. Where possible, an inspection of the interior of the thermal fluid heater and its appurtenances shall be made for the presence of foreign debris prior to making the final closure.	Generic i
S5.8.6 INSTALLATION REPORT a) Upon completion, inspection, and acceptance of the installation, the installer should complete and certify the Boiler Installation Report I-1. See 1.4.5.1.	Generic i?
S7.3.1 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….	This is not a Inspector responsibility?

PART 1, SECTION 8 INSTALLATION — PREPARATION OF TECHNICAL INQUIRIES TO THE NATIONAL BOARD INSPECTION CODE COMMITTEE SKIPPED INSPECTION IN THIS SECTION	
Authorized Inspection Agency (AIA) **Inservice**: An Authorized Inspection Agency is either: a) a jurisdictional authority as defined in the National Board Constitution; or b) an entity that is accredited by the National Board meeting NB-369, Accreditation of Authorized Inspection Agencies Performing Inservice Inspection Activities; NB-371, Accreditation of Owner-User Inspection Organizations (OUIO); or NB-390, Qualifications and duties for Federal Inspection Agencies (FIAs) Performing Inservice Inspection Activities. **New Construction**: An Authorized Inspection Agency is one that is accredited by the National Board meeting the qualification and duties of NB-360, Criteria for Acceptance of Authorized Inspection Agencies for New Construction. **Authorized Nuclear Inspection Agency** — An Authorized Inspection Agency intending to perform nuclear inspection activities and employing nuclear Inspectors / Supervisors	
Inspection — A process of review to ensure engineering design, materials, assembly, examination, and testing requirements have been met and are compliant with the code.	Capitol I Inspection.
Jurisdiction — The National Board member Jurisdiction where the organization is located. Alternatively,	

where the Jurisdiction elects not to perform the review or where there is no Jurisdiction or where the Jurisdiction is the organization's Authorized Inspection Agency, The National Board of Boiler and Pressure Vessel Inspectors will represent the Jurisdiction. At the Jurisdiction's discretion, the Jurisdiction may choose to be a member of the review team if the Jurisdiction chooses not to be the team leader.	
NBIC — The National Board Inspection Code published by The National Board of Boiler and Pressure Vessel Inspectors.	
Owner-User Inspection Organization — An owner or user of pressure-retaining items that maintains an established inspection program, whose organization and inspection procedures meet the requirements of the National Board rules and are acceptable to the jurisdiction or jurisdictional authority wherein the owner or user is located.	
Some in Interpretations	
Index **Inservice Inspection** (Introduction), (1.4.1), (8.1), (9.1) **Inspection** (Foreword), (Introduction), (1.4), (1.4.1), (1.4.2), (1.4.4), (1.4.5), (1.6.4), (2.3.3), (2.7.5), (2.10.1), (2.10.6), (3.3.4), (3.7.4), (3.10.3), (4.3.2), (4.5.6), (4.7.2), (5.3.6), (5.4), (S1.2), (S3.2.1), (S5.3.4), (S5.8.1), (S5.8.6), (7.1), (8.4), (9.1) **Owner-User Inspection Organization**	

(Introduction), (9.1)	

NBIC Part 1 Item 19-49

2.9.1 VALVE REQUIREMENTS – GENERAL (19)

a) Only direct spring loaded, pilot operated, or power actuated pressure relief valves designed to relieve steam shall be used for steam service.

b) Pressure relief valves shall be manufactured in accordance with a national or international standard.

c) Deadweight or weighted-lever pressure relief valves shall not be used.

d) For high-temperature water boilers, safety relief valves shall have a closed bonnet, and valve bodies shall not be constructed of cast iron.

e) Pressure relief valves with an inlet connection greater than NPS 3 (DN 80) used for pressure greater than 15 psig (103 kPa), shall have a flange or a welded inlet connection. The dimensions of flanges subjected to boiler pressure shall conform to the applicable standards.

f) When a pressure relief valve is exposed to outdoor elements that may affect operation of the valve, the valve may be shielded with a cover. The cover shall be vented and arranged to permit servicing and normal operation of the valve.

g) All covers, caps, and/or plugs utilized for shipping or transport shall be removed prior to installation or being placed in service.

h) Any wire or restraining device on lifting lever utilized for shipping or transport shall be removed prior to being placed in service.

3.9.1 PRESSURE RELIEF VALVE REQUIREMENTS – GENERAL

The following general requirements pertain to installing, mounting, and connecting pressure relief valves on heating boilers.

a) All covers, caps, and/or plugs utilized for shipping or transport shall be removed prior to installation or being placed in service.

b) Any wire or restraining device on lifting lever utilized for shipping or transport shall be removed prior to being placed in service.

Items Submitted by D. Patten, E. Wiggins & R. Spiker

Title	Submitter	Project Manager	Task Group Members	Item Type	Item Number	Interpretation Number	Item Status	Date Submitted	Date Closed
Review of installation requirements for Motors	D. Patten	Joe Brockman	Watson, Creacy	Action Item	20-30		Reported	1/14/2020	
Overcurrent Protection	D. Patten	Washington	Smith, Adams	Action Item	20-31		Reported	1/14/2020	
Electric Boilers	D. Patten	Creacy	Wadkinson, Austin, Clark	Action Item	20-32		Reported	1/14/2020	
Flow or Temp Sensing Devices forced Circulation Boilers	D. Patten	Downs	Patten, Wadkinson	Action Item	20-33		Reported	1/14/2020	
Venting of gas train components	D. Patten	Jennings	Washington, Adams	Action Item	20-34		Reported	1/14/2020	
Installation requirements for Fuel Oil Trains	D. Patten	Tompkins	Patten, Washington	Action Item	20-35		Reported	1/14/2020	
Review Installation requirements for Bonding & Grounding	D. Patten	Smith	Creacy, Spiker	Action Item	20-36		Reported	1/14/2020	
Electrical Requirements	E. Wiggins	Patten	Watson, Austin	Action Item	20-37		Reported	1/14/2020	
General Requirements for Wiring	E. Wiggins	Spiker	Anderson, Clark	Action Item	20-38		Reported	1/14/2020	
Modular Boilers	E. Wiggins	Clark	Downs, Wadkinson, Patten, Austin	Action Item	20-39		Reported	1/14/2020	
Gas Train Requirements	E. Wiggins	Adams	Jennings, Tompkins	Action Item	20-40		Reported	1/14/2020	
Safety and Safety Relief Valves for Steam and Hot Water Heating Boilers	E. Wiggins	Wiggins	Brockman, Spiker	Action Item	20-41		Reported	1/14/2020	
Pressure Controls for Steam Boilers	E. Wiggins	Austin	Creacy, Tompkins	Action Item	20-42		Reported	1/14/2020	
Safety Relief vlv for Hot Water Supply Boilers	R. Spiker	Anderson	Wiggins, Brockman	Action Item	20-43		Reported	1/14/2020	
CW-710	R. Spiker			Action Item	Delete Duplicate		Reported	1/14/2020	
CW Vaccum Boilers	R. Spiker	Watson	Washington, Jennings	Action Item	20-44		Reported	1/14/2020	
Temperature Control for Hot Water Boilers	R. Spiker	Wadkinson	Clark, Patten	Action Item	20-45		Reported	1/14/2020	

Item 19-77: Request for Revision to NBIC Part 1, 1.4.5.1.1 6), 10), and 20)

Purpose	Cast aluminum boilers have been incorporated in ASME Section IV for a number of years now and it's time they be recognized in the NBIC.
Scope:	Part: Installation; Section: 1 ; Paragraph: 1.4.5.1.1 items 6, 10 and 20
Background:	The installation report and guide were developed prior to cast aluminum boilers becoming an official part of ASME Section IV. It's suggested the guide item numbers and associated areas of the installation report be revised to incorporate cast aluminum boilers.
Proposed Revision:	See below for the proposed revision.

1.4.5.1.1 GUIDE FOR COMPLETING NATIONAL BOARD BOILER INSTALLATION REPORT

1) INSTALLATION: Indicate the type and date of installation — new, reinstalled, or second hand.

2) INSTALLER: Enter the installer’s name and physical address.

3) OWNER-USER: Enter the name and mailing address of the owner-user of the boiler.

4) OBJECT LOCATION: Enter the name of the company or business and physical address where the installation was made.

5) JURISDICTION NO.: Enter the Jurisdiction number if assigned at the time of installation.

6) NATIONAL BOARD NO.: Enter the assigned National Board number.
Note:
Cast ~~iron~~ boilers do not require National Board registration.

7) MANUFACTURER: Enter the boiler manufacturer’s name.

8) MFG. SERIAL NO.: Enter the assigned boiler manufacturer’s serial number.

9) YEAR BUILT: Enter the year the boiler was manufactured.

10) BOILER TYPE: Enter the type of boiler, e.g., watertube, firetube, cast ~~iron~~, electric, etc.

11) BOILER USE: Enter the service for which or for how the boiler will be used, e.g., heating (steam or water), potable water, etc.

12) FUEL: Enter the type of fuel, e.g., natural gas, diesel, wood, etc. If more than one fuel type, enter the types for which the boiler is equipped.

13) METHOD OF FIRING: Enter the method of firing, e.g., automatic, hand, stoker, etc.

14) Btu/KW INPUT: Enter the Btu/hr or kW input of the boiler.

15) Btu/KW OUTPUT: Enter the Btu/hr or kW output of the boiler.

16) OPERATING PSI: Enter the allowed operating pressure.

17) ASME CODE STAMP(S): Check the ASME Code stamp shown on the code nameplate or stamping of other certification mark (specify).

18) STAMPED MAWP: Enter the maximum allowable working pressure shown on the nameplate or stamping.

19) HEATING SURFACE SQ. FT.: Enter the boiler heating surface shown on the stamping or nameplate.
Note:
This entry is not required for electric boilers.

20) CAST BOILER ~~IRON~~: Enter the total number of sections for cast~~-iron~~ boilers.
Note:
Not all cast boilers are sectional. Mono-block cast boilers should be described as having one (1) section.

BOILER INSTALLATION REPORT I-1

INSTALLATION: (1) ☐ New ☐ Reinstalled ☐ Second Hand Date ____/____/____

(2) INSTALLER	(3) OWNER-USER	(4) OBJECT LOCATION
Name	Name	Name
Street	Street, PO Box, RR	Street
City, State, ZIP	City, State, ZIP	City, State, ZIP

Jurisdiction No. (5)	National Board No. (6)	Manufacturer (7)		Mfg. Serial No. (8)	Year Built (9)	Boiler Type (10)	Boiler Use (11)
Fuel (12)	Method of Firing (13)	Btu/kw input (14)	Btu/kw output (15)	Operating PSI (16)	Code Stamp(s) (17)	☐A ☐S ☐U ☐HLW ☐M ☐E ☐H ☐Other	
Stamped MAWP (18)	Heating Surface, Sq. Ft. (19)	Cast Iron (20)	Manhole (21)	Specific On-Site Location, i.e., Utility Room (22)			
Pressure Relief Valve Size (23)	Pressure Relief Valve Set Pressure (24)	Pressure Relief Valve Capacity ☐BTU/hr ☐Lb/hr (25)	Manufacturer (26)	Low-Water Fuel Cutoff Mfg. (27)			
1.	1.	1.	1.	Probe Type	No.		
2.	2.	2.	2.	Flow Switch			
3.	3.	3.	3.	Float & Chamber			
4.	4.	4.	4.	Other (Specify)			

PRESSURE/ALTITUDE GAGE: (28) Dial Graduation Valve/Cock Size ____ MAWP ____ Pipe Connection Size Siphon or Equivalent Device ☐Yes ☐No	EXPANSION TANK: (29) ASME Constructed ☐Yes ☐No Other MAWP No. Gallons	VENTILATION AND COMBUSTION AIR (30) Unobstructed Opening (sq. in.) Power Ventilator Fan (CFM)
WATER LEVEL INDICATORS: (31) Numer of Gage Glasses Number of Remote Indicators Size of Connection Piping		FEEDWATER SUPPLY: (32) Number of Feeding Means Pipe Size Stop Valve Size ____ MAWP ____ Check Valve Size ____ MAWP ____
STOP VALVES: (33) Number of Valves Valve Size		EXTERNAL PIPING ASME CODE: (40) ☐Yes ☐No ☐Other FUEL TRAIN: ☐CSD-1 ☐NFPA-85 ☐Other
BOTTOM BLOWDOWN CONNECTIONS: (39) Number of Valves Valve Size ____ MAWP ____ Piping Run Full Size ☐Yes ☐No		POTABLE WATER HEATER UNIQUE REQUIREMENTS ☐Yes ☐No (34) Inlet Stop Valve Size ____ MAWP ____ Outlet Stop Valve Size ____ MAWP ____ Drain Valve Size Thermometer ☐Yes
Manufacturer's Certification Attached: ☐Yes ☐No (35)		Clearance from walls and floors: Side ____ Bottom ____ Top ____ (36)
Does boiler replace existing one: ☐Yes ☐No (36)		

Additional recommendations and remarks by installer:

(37)

(38)		I HEREBY CERTIFY THAT THE INSTALLATION COMPLIES WITH APPENDIX I (38)
Installer Name (PRINT)	Registration #	Installer Signature

This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Ave., Columbus, OH 43229 NB-365 Rev. 2

Item 19-80

Subject: Conflicting statements in Part 1 and Part 2 about boiler controls

NBIC Location: Part 2, 2.2.10.6 l) 1)

Explanation of Need: Requirements in this section need to be consistent with Part 1, 2.8.4 a) to avoid confusion.

Background Information:
2.8.4 PRESSURE CONTROL (From NBIC Part 1)
Each automatically fired steam boiler shall be protected from overpressure by two pressure operated controls.
a) Each individual steam boiler or each system of commonly connected steam boilers shall have a control that will cut off the fuel supply when the steam pressure reaches an operating limit, which shall be less than the maximum allowable working pressure.

2.2.10.6 CONTROLS (From NBIC Part 2)
l) Check that the following controls/devices are provided:
1) Each automatically fired steam boiler is protected from overpressure by not less than two pressure operated controls, one of which may be an operating control.

Proposed Revision:
l) Check that the following controls/devices are provided:

1) Each automatically fired steam boiler is protected from overpressure by not less than two pressure operated controls~~, one of which may be an operating control.~~.

When required by the code of construction or the jurisdiction, the high pressure limit control shall be of the manual reset type.

2) Each automatically fired hot-water boiler or hot-water boiler system is protected from over-temperature by not less than two temperature operating controls, one of which may be an operating control.

When required by the code of construction or the jurisdiction, the high temperature limit control shall be of the manual reset type.

3) Each hot-water boiler is fitted with a thermometer that will at all times, indicate the water temperature at or near the boiler outlet.

2.8.2.1 CONNECTION

a) For a steam boiler the gage or connection shall contain a siphon or equivalent device that will develop and maintain a water seal that will prevent steam from entering the gage tube. A valve or cock shall be placed in the gage connection adjacent to the gage. An additional valve or cock should be located near the boiler providing it is locked or sealed in the open position. No other shut-off valves shall be located between the gage and the boiler.

b) Pressure gage connections shall be suitable for the maximum allowable working pressure and temperature, but if the temperature exceeds 406°F (208°C), brass or copper pipe or tubing shall not be used. The connections to the boiler, except for the siphon, if used, shall not be less than NPS 1/4 (DN 8). Where steel or wrought iron pipe or tubing is used, it shall not be less than 1/2 in. (13 mm) inside diameter. The minimum size of a siphon, if used, shall be 1/4 in. (6 mm) inside diameter.

2.8.3 TEMPERATURE

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.

2.8.4 PRESSURE CONTROL

Each automatically fired steam boiler shall be protected from overpressure by two pressure operated controls.

a) Each individual steam boiler or each system of commonly connected steam boilers shall have a control that will cut off the fuel supply when the steam pressure reaches an operating limit, which shall be less than the maximum allowable working pressure.

b) Each individual automatically fired steam boiler shall have a safety limit control, with a manual reset, that will cut off the fuel supply to prevent steam pressure from exceeding the maximum allowable working pressure of the boiler. Each control shall be constructed to prevent a pressure setting above the maximum allowable working pressure of the boiler.

c) Shutoff valves of any type shall not be placed in the steam pressure connection between the boiler and the controls described in a) and b) above. These controls shall be protected with a siphon or equivalent means of maintaining a water seal that will prevent steam from entering the control. The connections to the boiler shall not be less than NPS 1/4 (DN 8), but where steel or wrought iron pipe or tubing is used, they shall not be less than NPS 1/2 (DN 15). The minimum size of an external siphon shall be NPS 1/4 (DN 8) or 3/8 in. (10 mm) outside diameter nonferrous tubing. For manifold connections, the minimum size shall be as specified in the original code of construction.

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

Item 19-81

Correction to value in Table 3.7.9.1-b

Background Information: The table in question is generated using the equation in 3.7.9.1 a) 2). The values in the table are all based on the same temperatures and pressures. The only thing that changes is the volume. The ratio of the Nonpressurized Type column value to the System Volume is 0.15 in all cases except the 100 gallon case which ends up being 0.18. Thus multiplying any system volume by 0.15 should give the third column value.

Proposed Change:

TABLE 3.7.9.1-b

EXPANSION TANK CAPACITIES FOR FORCED HOT-WATER SYSTEMS

Based on average operating water temperature 195°F [91°C], fill pressure 12 psig [83 kPa], and maximum operating pressure 29 psig [200 kPa]		
Tank Capacities, gallon (l)		
System Volume	**Pressurized Diaphragm Type**	**Nonpressurized Type**
100 (379)	9 (34)	~~18 (68)~~15 (57)
200 (757)	17 (64)	30 (114)
300 (1136)	25 (95)	45 (170)
400 (1514)	33 (125)	60 (227)
500 (1893)	42 (159)	75 (284)
1,000 (3785)	83 (314)	150 (568)
2,000 (7571)	165 (625)	300 (1136)