



THE NATIONAL BOARD
OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD INSPECTION CODE SUBGROUP INSTALLATION

MINUTES

Meeting of July 11, 2023
St. Louis, MO

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
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1. Call to Order

Since Mr. Brockman was not able to be present for the meeting, Vice Chair Mr. Eddie Wiggins called the meeting to order at 8:00 a.m. Central Time. Mr. Wiggins moved to elect Mr. Patten to serve as Chair Pro-Tem for this meeting as he was there in person. The motion was seconded and unanimously approved.

2. Introduction of Members and Visitors

Mr. Patten held roll call with the members and visitors. Each member and visitor (in person and remote) introduced themselves with their name and company. All attendees are listed on **Attachment Page 1**.

3. Check for a Quorum

With 12 out of 14 members present, in person and remote, a quorum was reached.

4. Awards/Special Recognition

Mr. Gary Scribner presented Mr. Konopacki with a pin for his 15 years of service as a member of Installation.

5. Announcements

Mr. Patten gave the following announcements:

- The National Board will be hosting a reception on Wednesday evening from 5:30 p.m. to 7:30 p.m. at Sports & Social St. Louis Ballpark Village next to the hotel.
- The National Board will be hosting breakfast and lunch on Thursday for those attending the Main Committee meeting. Breakfast will be served from 7:00 a.m. to 8:00 a.m. in Cardinal C, and lunch will be served from 11:30 a.m. to 12:30 p.m. in Cardinal C.
- Meeting schedules, meeting room layouts, and other helpful information can be found on the National Board website under the **Inspection Code** tab → NBIC Meeting Information.
- Remember to add any attachments that you'd like to show during the meeting (proposals, reference documents, power points, etc.) to the NBIC file share site (nbfileshare.org) **prior to the meeting**.
 - Note that access to the NBIC file share site is limited to committee members only.
 - ALL power point attachments/presentations must be sent to the NBIC Secretary prior to the meeting for approval.
 - Contact Jonathan Ellis (nbicsecretary@nbbi.org) for any questions regarding NBIC file share access.
- When possible, please submit proposals in word format showing “strike through/underline”.
- If you'd like to request a new Interpretation or Action item, this should be done on the National Board Business Center.
 - Anyone, member or not, can request a new item.
- As a reminder, anyone who would like to become a member of a group or committee:
 - Should attend at least two meetings prior to being put on the agenda for membership consideration. The nominee will be on the agenda for voting during their third meeting.
 - The nominee must submit the formal request along with their resume to the NBIC Secretary **PRIOR TO** the meeting. nbicsecretary@nbbi.org
 - If needed, we can also create a ballot for voting on a new member between meetings.
- Thank you to everyone who registered online for this meeting. The online registration is very helpful for planning our reception, meals, room set up, etc. Please continue to use the online registration for each meeting. If you are here in person, and did not register, please visit the National Board website to register now. Registering will ensure we have an accurate count for the reception, breakfast, and lunch. It is also a good way to ensure we have the most up-to-date contact information.

Ms. Vance added the announcements noted below:

- Microsoft Teams Notes:
 - If you are remote, please stay muted during the meeting. If you would like to speak, please use the “raise hand” feature, and then you can unmute as you are called on. Teams will note the order in which your hands were raised, and we will call on you in order.
 - Any messages sent through chat will be displayed for anyone in the meeting to see. If you need to send me a private message, please email me directly (mvance@nationalboard.org) instead of using the meeting chat.
- U.S. Chemical Safety Board Presentation
 - Representatives from the U.S. Chemical Safety Board will be giving a presentation regarding the 2017 Loy Lange Box Company pressure vessel explosion. This presentation will be simulcast to the meeting room via MS Teams. Once the presentation begins, virtual attendees are encouraged to join the Subgroup Repairs & Alterations meeting and then at the conclusion of the presentation rejoin the Subgroup Installation meeting.

6. Adoption of the Agenda

A motion to adopt the agenda as presented was made, seconded, and unanimously approved.

7. Approval of the Minutes of January 10, 2023, Meeting

A motion to approve the minutes from the January 10, 2023, meeting was made, seconded, and unanimously approved.

8. Review of Rosters

a. Membership Nominations

There were no membership nominations for this meeting.

b. Membership Reappointments

There were no membership reappointments for this meeting.

c. Officer Appointments

There were no officer appointments for this meeting.

9. Mr. Patten asked Ms. Wadkinson to share some of the discussion regarding subgroup and subcommittee membership from the Executive Committee meeting. The discussion focused on succession planning, primarily the importance of making room for others to join the committees. At this point Installation is not in a place to start removing members to make room for others. However, we should be encouraging others to join and participate in actively improving the Code with us.

10. U.S. Chemical Safety Board Presentation

At 8:20 a.m. Central Time, representatives from the U.S. Chemical Safety Board gave a presentation regarding the 2017 Loy Lange Box Company pressure vessel explosion. This presentation was simulcasted to the meeting room via MS Teams. Virtual attendees joined the Subgroup Repairs & Alterations meeting to watch the presentation and then rejoined the Subgroup Installation meeting when the presentation concluded. The presentation is available on the Cloud.

11. Open PRD Items Related to Installation

- NB15-0305 – Create Guidelines for Installation of Overpressure Protection by System Design – D. Marek (PM).
 - Mr. Patten reported that this ballot passed for both subgroups.

- NB15-0315 – Review isolation valve requirements in Part 1, 4.5.6 and 5.3.6 – D. DeMichael (PM)
 - Progress Report
- 19-83 – Address Alternate Pressure Relief Valve Mounting Permitted by ASME CC2887-1 – D. Marek (PM)
 - Progress Report:
 - Ballot failed in PRD.
 - Ballot passed Part 1 with 11 approvals and 2 disapprovals. Mr. Jennings explained his disapproval being tied to concerns on some of the proposal’s verbiage. Ms. Wadkinson explained her disapproval: the Code language incorporated was specific to low mass watertube boilers/water heaters. The language in this proposal does not limit installation to those two types of boilers, and therefore presents a potential conflict with ASME.
- 22-08 – Review and improve guidance for T&P valve installation relating to probe.
 - Progress Report
- 22-15 – What is the meaning of "service limitations" as used in Part 4, 2.4.5?
 - This was balloted to both subgroups and passed.
- 22-16 – Allow the use of pressure relief valves on potable water heaters.
 - Mr. David Sullivan of Part 4 came in to explain Part 4’s proposal which used language from HLW.
 - Part 1 had some discussion on the second sentence of the Note in Part 4, 2.4.4 a) and Part 1, 3.9.4 a): “Low mass water heaters may use pressure relief valves due to space limitations and smaller amounts of stored energy.” They decided to remove that sentence. A motion to accept the proposal as revised was made, seconded, and unanimously approved. See **Attachment Pages 2-4**.
 - Once Part 4 SC meets, they will share their take on the revised proposal.

12. Interpretations

There were no Part 1 interpretation requests to address.

13. Action Items

Item Number: 20-62	NBIC Location: Part 1, 1.4.5.1	No Attachment
<p>General Description: Update the National Board Boiler Installation Report</p> <p>Subgroup: SG Installation</p> <p>Task Group: T. Clark (PM), E. Wiggins, R. Spiker, T. Creacy, P. Jennings, and D. Patten</p> <p>Explanation of Need: The form has not been updated in years. The form will be part of the National Board’s Jurisdictional Reporting System (JRS) which is currently under development.</p>		
<p>July 2023 Meeting Action: Progress Report</p> <p>Mr. Clark brought up the report and the corresponding instructions. The group discussed adding a block under “Code Information” to apply to Modular boilers (NB/serial numbers).</p> <p>It was also noted that if formatting of the report pushes it onto another page, JRS staff will need to add verbiage that makes it clear that the applicable pages are part of the same report (e.g., owner info, stamp, etc. displayed on each page).</p>		

Item Number: 20-86	NBIC Location: Part 1, 2.10.1 a)	No Attachment
<p>General Description: Testing and Acceptance: Boil-out Procedure</p> <p>Subgroup: SG Installation</p> <p>Task Group: E. Wiggins (PM), D. Patten, S. Konopacki, and R. Spiker</p> <p>Explanation of Need: This was brought to my (Mr. Eddie Wiggins) attention by Ernest Brantley. Mr. Brantley indicated during an acceptance inspection, he found boiler with excessive oil on the tubes and tube sheet after boiler was delivered and installed. He could not find any reference to boil-out to remove this extraneous material.</p>		
<p>July 2023 Meeting Action: Progress Report</p> <p>Mr. Wiggins stated that a proposal was sent to Part 3 but that they didn't feel they needed to take any action. Mr. Wiggins will have a proposal ready for the subcommittee meeting.</p>		

Item Number: 22-28	NBIC Location: Part 1	No Attachment
<p>General Description: Pool Heater requirements and definition</p> <p>Subgroup: SG Installation</p> <p>Task Group: J. Kleiss (PM), R. Spiker, T. Creacy, and M. Byrum</p> <p>Explanation of Need: The NBIC Installation and Inspection Codes do not have a definition for pool heaters. There is potential for confusion regarding which NBIC requirements, if any, should apply to pool heaters.</p>		
<p>July 2023 Meeting Action: Progress Report</p> <p>Mr. Kleiss presented his proposal. The group discussed changing the verbiage for "appliance" (in proposal) since it wouldn't align with the Glossary definition. Mr. Kleiss will revise his proposal with new verbiage. He will also work with Mr. Clark on adding "Pool Heater Unique Requirements" to the Boiler Installation Report and its corresponding instructions (Item 20-62).</p>		

Item Number: 22-30	NBIC Location: Part 1, 3.6.3	Attachment Pages 5-7
General Description: Drains in equipment rooms with heating boilers containing glycol		
Subgroup: SG Installation		
Task Group: P. Jennings (PM), R. Adams, D. Zalusky, D. Patten, and R. Smith		
Explanation of Need: Glycol should be disposed of in accordance with regulations. The intent of this addition to the text is to identify that drains may not be the proper way to dispose of glycol.		
July 2023 Meeting Action: Proposal		
Mr. Jennings presented his proposal. The group discussed the verbiage of “drain systems” vs. “floor drain systems” referenced in 3.6.3. They also revised the verbiage of 3.7.7.1 b) 2) and 3.9.1.5 f) to say, “potentially hazardous fluids, such as ethylene glycol.” After a break, Mr. Jennings presented his revised proposal. A motion to accept the proposal as revised was made, seconded, and unanimously approved.		

Item Number: 22-32	NBIC Location: Part 1, 3.8.1.4 b)	No Attachment
General Description: High pressure limit control requirements for fired jacketed steam kettles		
Subgroup: SG Installation		
Task Group: R. Adams (PM), D. Patten, T. Clark, and T. Creacy		
Explanation of Need: As a safeguard to over pressurizing the fired jacketed steam kettle, the pressure range of the actuated high pressure limit control should not exceed the MAWP of the vessel.		
July 2023 Meeting Action: Progress Report		
Mr. Clark reported on the proposal. They added verbiage to align with ASME Section VIII. The group discussed adding a definition of “kettle” to the Glossary. The task group will draft a proposal as a supplement on kettles.		

14. New Items:

Item Number: 23-50	NBIC Location: Part 1, 2.8.5 and 3.8.1.5	Attachment Pages 8-9
General Description: Require separate waterside piping connections for multiple LWCO devices		
Subgroup: SG Installation		
Task Group: None assigned.		
Explanation of Need: CSD-1 CW-120 (a) and CW-140 (a) address piping connection requirements for low-water fuel cutoff devices for low-pressure and high-pressure steam boilers. Specifically, both sections require each LWCO device to have a separate piping connection on the waterside. However, NFPA 85 does not address any installation requirements for LWCO devices, potentially allowing them to be installed in an unsafe manner.		
July 2023 Meeting Action: Proposal		
Mr. Clark explained the reasoning behind this item. The group made a few editorial revisions. A motion to accept the proposal as revised was made, seconded, and unanimously approved. A task group was also created in the event the item does not pass.		
Task Group: T. Clark (PM), T. Creacy, M. Byrum, John Choitz, and R. Spiker		

Item Number: 23-52	NBIC Location: Part 1, 2.5.3.2 and 3.5.3	No Attachment
General Description: Harmonize electrical requirements for all types of boilers/water heaters		
Subgroup: SG Installation		
Task Group: None assigned.		
Explanation of Need: Electrical requirements for power boilers, heating boilers, and water heaters are inconsistent, particularly regarding remote emergency shutdown switches. In some cases the requirements are the same, but worded or ordered differently. In order to promote better understanding of code requirements and consistency in their application, I propose making sections 2.5.3 and 3.5.5 as uniform as possible.		
July 2023 Meeting Action: Progress Report		
Mr. Clark presented his proposal which would address the inconsistencies between Sections 2.5.3 and 3.5.3 There was also some discussion on if 2.5.3.2 f) is necessary. The group revised the proposal. Mr. Clark will continue to update his proposal. A task group was created.		
Task Group: T. Clark (PM), S. Konopacki, J. Kleiss, R. Spiker, and John Choitz		

Item Number: 23-53	NBIC Location: Part 1, 1.4.1, 1.4.5	No Attachment
<p>General Description: Remove "Form" from the title of the various NBIC reports.</p> <p>Subgroup: SG Installation</p> <p>Task Group: None assigned.</p> <p>Explanation of Need: There are many inconsistencies in the terms and titles regarding the various reports used to document installation, inspection, repair, and alteration activity used in the NBIC. For standardization, this proposal has two parts, 1) revise the I-2, NB-6, NB-7, NB-136, NB-66, NB-299 etc., report titles to delete "form", and 2) to replace "form" in the applicable areas with "report." An example of a revision to the text in the body of the NBIC is shown in the "Proposed Text."</p>		
<p>July 2023 Meeting Action: Close with no Action</p> <p>Mr. Scribner explained the idea behind this proposal. The group discussed the word "form" being used to describe how data is input and the word "report" being used to describe how data is received (output of data). Later, Mr. Ponce updated the group on Part 2's thoughts on this. Part 2 would like the National Board to perform an editorial check to align all verbiage to be consistent with the exact titles of these reports. A motion was made to close this item with no further subgroup action. The motion was seconded and unanimously approved. A task group was created in the event this item does not close.</p> <p>Task Group: T. Creacy (PM), T. Clark, and R. Adams</p>		

15. Future Meetings

Mr. Patten discussed the future NBIC meetings.

- January 8-11, 2024 – Charlotte, NC
- July 2024 – TBD

16. Adjournment

A motion to adjourn the meeting at 3:58 p.m. Central Time was made, seconded, and unanimously approved.

Respectfully submitted,



Michelle Vance
Subgroup Installation Secretary

Subgroup Installation Attendance: July 11, 2023

MEMBERS:	Interest Category	In Person	Remote	Not In Attendance
Joe Brockman	Authorized Inspection Agencies			X
Eddie Wiggins	Jurisdictional Authorities		X	
Rodger Adams	Authorized Inspection Agencies			X
Jim Byrum	Authorized Inspection Agencies	X		
Tom Clark	Jurisdictional Authorities	X		
Todd Creacy	Authorized Inspection Agencies	X		
J. Matt Downs	Manufacturers	X		
Pat Jennings	Authorized Inspection Agencies	X		
Jeff Kleiss	Manufacturers	X		
Stan Konopacki	Users	X		
Don Patten	NB Certificate Holders	X		
H. Michael Richards	General Interest		X	
Ron Spiker	Jurisdictional Authorities	X		
Melissa Wadkinson	Manufacturers	X		
Michelle Vance	Secretary	X		

VISITORS:	Company / Interest	In Person	Remote
Bryan Ahee	Bradford White Corporation	X	
Jonathan Choitz	Hartford Steam Boiler	X	
Joseph Arvizu III	HSI Group		X
Robert Black	ABMA	X	
Robert Smith	Naval Facilities Engineering Systems Command	X	
Luis Ponce	NBBI Staff	X	
Gary Scribner	NBBI Staff	X	
Mark Mooney	NBBI Staff	X	

Part 4, 2.4.4 and Part 1, 3.9.4

Explanation of Need:

ASME Section IV, Part HLW-800.1 allows the use of pressure relief valves in place of temperature and pressure relief valves on potable water heaters. NBIC Parts 1 and 4 specifically require temperature and pressure relief valves, which is not consistent with the code of construction. Some manufacturers are shipping HLW stamped potable water heaters with pressure relief valves. Often the physical construction of these units is such that a temperature and pressure relief valve cannot be accommodated.

Suggested revisions to current text

Part 4

2.4.4 ~~TEMPERATURE AND~~ PRESSURE RELIEF VALVE REQUIREMENTS FOR POTABLE WATER HEATERS

- a) Each water heater shall have at least one ~~spring-loaded~~ National Board capacity ~~certified~~ temperature and pressure relief valve ~~or pressure relief valve~~. No ~~temperature and~~ pressure relief valve shall be smaller than NPS 3/4 (DN 20). Note: Temperature and pressure relief valves are recommended for fired storage water heaters because of the additional temperature relief function they provide, and other standards for this equipment may require temperature and pressure relief valves.
- a)
- b) The pressure setting shall be less than or equal to the maximum allowable working pressure of the water heater. However, if any of the other components in the hot-water supply system (~~such as e.g.~~ valves, pumps, expansion or storage tanks, or piping) have a ~~lesser lower~~ working pressure rating than the water heater, the pressure setting for the ~~temperature and~~ pressure relief valve(s) shall be based upon the component with the lowest maximum allowable working pressure rating. If more than one ~~temperature and~~ pressure relief valve is used, the additional valve(s) may be set within a range not to exceed 110% above of the set pressure of the first valve.
- c) The required relieving capacity ~~in Btu/hr (W)~~ of the ~~temperature and~~ pressure relief valve in Btu/hr (W) shall not be less than the maximum ~~allowable rated heat~~ input unless the rated burner input capacity the water heater is marked on the water heater casing in a readily visible location. ~~with the rated burner input capacity of the water heater on the casing in a readily visible location,~~ in which this case, the rated burner input capacity may be used as a basis for sizing the temperature and pressure relief valves. The relieving capacity for electric water heaters shall be 3500 Btu/hr (1.0 kW) per kW of input. In every case, the ~~following requirements shall be met.~~ ~~Temperature and p~~Pressure relief valve capacity for each water heater shall be such that, with the fuel burning equipment installed and operating at maximum capacity, the pressure cannot ~~rise more than exceed~~ 110% above of the maximum allowable working pressure.

Many temperature and pressure relief valves have a National Board capacity-certified rating which was determined according to ASME Code requirements, and a lower Canadian Standards Association (CSA) rating value. Where the ASME Code is the only referenced code of construction the National Board capacity-certified rating may be used. If the water heater is not an ASME vessel, or the CSA rating is required by another standard, (such as a plumbing or building code,) then that rating shall be used.

- d) If operating conditions are changed or additional heating surface is installed, the ~~temperature and~~ pressure relief valve capacity shall be increased, if necessary, to meet the new conditions and shall be in accordance with the above provisions. In no case shall the increased input capacity exceed the maximum allowable input capacity. ~~The Any~~ additional valves required, ~~on account of~~ resulting from changed conditions, may be installed on the outlet piping provided ed there is no intervening valve.

Part 1

3.9.4 PRESSURE RELIEF VALVE REQUIREMENTS FOR POTABLE WATER HEATERS

- a)b) Each water heater shall have at least one spring-loaded National Board capacity-certified temperature and pressure relief valve or pressure relief valve. No ~~temperature and~~ pressure relief valve shall be smaller than NPS 3/4 (DN 20). Note: Temperature and pressure relief valves are recommended for fired storage water heaters because of the additional temperature relief function they provide, and other standards for this equipment may require temperature and pressure relief valves.
- b)c) The pressure setting shall be less than or equal to the maximum allowable working pressure of the water heater. However, if any of the other components in the hot-water supply system (such as e.g., valves, pumps, expansion or storage tanks, or piping) have a lower ~~lesser~~ working pressure rating than the water heater, the pressure setting for the ~~temperature and~~ pressure relief valve(s) shall be based upon the component with the lowest maximum allowable working pressure rating. If more than one ~~temperature and~~ pressure relief valve is used, the additional valve(s) may be set within a range not to exceed 110% over of the set pressure of the first valve.
- e)d) The required relieving capacity in Btu/hr (W) of the ~~temperature and~~ pressure relief valve in Btu/hr (W) shall not be less than the maximum ~~allowable rated heat~~ input unless the rated burner input capacity the water heater is marked on the water heater casing in a readily visible location. with the rated burner input capacity of the water heater on the casing in a readily visible location, i n which this case, the rated burner input capacity may be used as a basis for sizing the temperature pressure relief valves. The relieving capacity for electric water heaters shall be 3,500 Btu/hr (1.0 kW) per kW of input. In every case, ~~the following requirements shall be met. T~~ temperature and p Pressure relief valve capacity for each water heater shall be such that, with the fuel burning equipment installed and

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Submitted by: Joe Ball, Dave Sullivan, Tom Clark
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operated at maximum capacity, the pressure cannot ~~rise more than~~exceed 110% above of the maximum allowable working pressure.

Many temperature and pressure relief valves have a National Board capacity_certified rating which was determined according to ASME Code requirements, and a lower Canadian Standards Association (CSA) rating value. Where the ASME Code is the only referenced code of construction the National Board capacity_certified rating may be used. If the water heater is not an ASME vessel, or the CSA rating is required by another standard, ~~(such as a plumbing or building code.)~~ then that rating shall be used.

~~e)~~ If operating conditions are changed or additional heating surface is installed, the ~~temperature and~~ pressure relief valve capacity shall be increased, if necessary, to meet the new conditions and shall be in accordance with the above provisions. In no case shall the increased input capacity exceed the maximum allowable input capacity. ~~The~~ Any additional valves required, ~~on account of resulting from~~ changed conditions, may be installed on the outlet piping provided eding there is no intervening valve.

Item Number: 22-30	NBIC Location: Part 1, 3.6.3	No Attachment
General Description: Drains in equipment rooms with heating boilers containing glycol		
Subgroup: SG Installation		
Task Group: P. Jennings (PM), R. Adams, D. Zalusky, D. Patten, and R. Smith		
Explanation of Need: Glycol should be disposed of in accordance with regulations. The intent of this addition to the text is to identify that drains may not be the proper way to dispose of glycol.		
January 2023 Meeting Action: Mr. Patten said that a task group has been assigned to this item, and that they are currently working on a proposal.		

Suggested Proposal.

3.6.3 DRAINS

Drain systems shall be installed in accordance with jurisdictional and environmental requirements, manufacturer's recommendations, and/or industry standards, as applicable. Unobstructed ~~floor~~ drains, properly located in the equipment room, will facilitate proper cleaning of the equipment room. ~~Floor~~ ~~#Drains~~ that are used infrequently should have water poured into them periodically to prevent the entrance of sewer gasses and odors. If there is a possibility of freezing, an environmentally safe antifreeze mixture should be used in the drain traps. Drains receiving blowdown water should be connected to the sanitary sewer by way of an acceptable blowdown tank or separator or an air gap that will allow the blowdown water to cool to at least 140°F (60°C) and reduce the pressure to 5 psig (34 kPa) or less.

3.7.7 BOTTOM BLOWOFF AND DRAIN VALVES

3.7.7.1 STEAM HEATING, HOT-WATER HEATING, AND HOT-WATER SUPPLY BOILERS

a) Bottom Blowoffs

- 1) Each steam boiler shall have a bottom blowoff connection fitted with a valve or cock connected to the lowest water space practicable with a minimum size as shown in NBIC Part 1, Table 3.7.7.1. The discharge piping shall be full size to the point of discharge.
- 2) Boilers having a capacity of 25 gallons (95 l) or less are exempt from the above requirements, except that they shall have a NPS 3/4 (DN 20) minimum drain valve.

b) Drains

- 1) Each steam or hot-water boiler shall have one or more drain connections, fitted with valves or cocks connecting to the lowest water containing spaces. All parts of the boiler must be capable of being drained (the boiler design will dictate the number and size of drains). The minimum size of the drain piping, valves, and cocks shall be NPS 3/4 (DN 20). The discharge piping shall be full size to the

point of discharge.

2) For hot-water boilers with potentially hazardous fluids, such as ethylene glycol, discharge to drains should consider any environmental requirements.

3) When the blowoff connection is located at the lowest water containing space, a separate drain connection is not required.

3.9.1.5 PRESSURE RELIEF VALVE DISCHARGE PIPING

- a) A discharge pipe shall be used. Its internal cross-sectional area shall be not less than the full area of the valve outlet or of the total of the valve outlets discharging thereinto, and shall be as short and straight as possible and arranged as to avoid undue stress on the valve or valves. A union may be installed in the discharge piping close to the valve outlet. When an elbow is placed on a pressure relief valve discharge pipe, it shall be located close to the valve outlet downstream of the union to minimize reaction moment stress.
- b) The discharge from pressure relief valves shall be so arranged that there will be no danger of scalding attendants. The pressure relief valve discharge shall be piped away from the boiler to a safe point of discharge, and there shall be provisions made for properly draining the piping. The size and arrangement of discharge piping shall be such that any pressure that may exist or develop will not reduce the relieving capacity of the relieving devices below that required to protect the boiler.
- c) Discharge piping shall be rated for the discharge fluid conditions of pressure and temperature including a minimum and maximum design temperature. Material selection for the discharge piping shall consider the reduction in material toughness at the low end of design temperature and the reduction in material strength at the high end of design temperature. Rigid pipe or tubing should be used for discharge lines that carry hot water or steam.
- d) Plastic discharge pipe and fittings are permitted (when compatible with the process fluid, system design temperatures, and other ambient conditions such as light and humidity) and shall conform to NSF/ANSI 14 Plastics Piping System Components and Related Materials.
- e) Discharge piping shall be rated for any static pressure present and the back pressure that may develop when the pressure relief device is at full capacity. Where multiple pressure relief devices or vents discharge into common piping, the back pressure that could develop due to simultaneous flow from all sources shall be considered.
- f) For hot-water boilers with potentially hazardous fluids, such as ethylene glycol, discharge to drains should consider any environmental requirements.

NOTES – The following are explanatory and are not part of the proposal

There are three appropriate places to address the issue of discharge of glycol or other hazardous fluids in heating boilers:

- 1) floor drains – Conform this section to other sections where environmental requirements are discussed.
- 2) Bottom blowdown discharge piping – Add a “should consider”
- 3) Relief valve discharge piping – Add a “should consider” for glycol

FOR DRAINS

COMMENT – The proposed language already exists in the book.

) 1.6.5 FUEL

All fuel systems shall be installed in accordance with jurisdictional and environmental requirements, manufacturer's recommendations, and/or industry standards, such as ASME CSD-1; ANSI Z/CSA; NFPA 85; Boiler and Combustion Systems Hazards Codes; or others as applicable. The following are requirements for Natural Gas, Propane, and #2 fuel oil.

- a) Natural Gas and Propane

2.5.3.3 also and 2.6.2

2.6.2 ASH REMOVAL

Ash removal systems shall be installed in accordance with jurisdictional and environmental requirements, manufacturer's recommendations, and/or industry standards, as applicable.

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) When installed external to the boiler, low-water fuel cutoffs shall be installed in separate water columns or chambers, which shall be connected to the boiler by piping connections below the waterline. A shared steam piping connection is permissible, though not required.

~~d)e)~~ 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.

~~e)f)~~ Each electric steam boiler of the resistance element type shall be equipped with an automatic low-water cutoff so located as to automatically cut off the power supply to the heating elements before the surface of the water falls below the visible part of the glass. No low-water cutoff is required for electrode-type boilers.

3.8.1.5 AUTOMATIC LOW-WATER FUEL CUTOFF AND/OR WATER FEEDING DEVICE

a) Each automatically fired steam boiler shall have an automatic low-water fuel cutoff. The low-water fuel cutoffs must be located to automatically cut off the fuel supply when the surface of the water falls to a level not lower than 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-gage 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 boiler.

d) When installed external to the boiler, low-water fuel cutoffs shall be installed in separate water columns or chambers, which shall be connected to the boiler by piping connections below the waterline. A shared steam piping connection is permissible, though not required.

~~d)e)~~ Fuel cutoffs and water feeding devices embodying a separate chamber shall have a vertical drain pipe 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.

CW-120 Requirements for Water Level Controls for Low-Pressure Steam Boilers

(a) Each automatically fired, low-pressure steam boiler shall have at least two automatic low-water fuel cutoffs, one of which may be a combined feeder/cutoff device. When installed external to the boiler, each device shall be installed in individual chambers (water columns), which shall be attached to the boiler by separate pipe connections below the waterline. A common steam connection is permissible. Each cutoff device shall be installed to prevent start-up and to cut off the boiler fuel or energy supply automatically, prior to the fall of the surface of the water below the level of the lowest visible part of the gage glass (see [CW-210](#)).

EXCEPTION: Only one low-water cutoff is required on gravity return units installed in residences, as defined by the authority having jurisdiction.

A water feeding device, when used, shall be constructed and installed so that the water inlet valve cannot feed water into the boiler through the float chamber or its connections to the boiler. The water feeding device shall be located to maintain the operating water level.

CW-140 Requirements for Water Level Controls for High-Pressure Steam Boilers

(a) Each automatically fired, high-pressure steam boiler, except miniature boilers, shall have at least two automatic low-water fuel cutoff devices. When installed external to the boiler, each device shall be installed in individual chambers (water columns), which shall be attached to the boiler by separate pipe connections below the waterline. A common steam connection is permissible. Each cutoff device shall be installed to prevent start-up and cut off the boiler fuel or energy supply automatically when the surface of the water falls to a level not lower than the lowest visible part of the gage glass. One control shall be set to function ahead of the other.