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THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD SUBGROUP INSTALLATION

MINUTES

Meeting of January 9th, 2018
New Orleans, LA

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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 8:10 a.m.

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

- Introductions took place amongst all members and visitors and an attendance sheet was circulated for review and check off.
- Gene Tompkins was sitting in for Geoffrey Halley.

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

3. **Announcements**

- The National Board hosted a reception for all committee members and visitors on Wednesday evening at 5:30 p.m. in the Lagniappe room on the second floor.

- Breakfast and lunch was provided to NBIC Committee members and visitors on Thursday.

- Announced a reminder that the MC NBIC meeting will run all day on Thursday until 5 p.m.

- Announced that there will be upcoming officer positions open of the following:

  Chair of SC Installation
  Chair of SG Installation

  Interested individuals will need to inform the secretary. The interested individual must have 2 years' experience of being on the committee.

- Members and visitors must mark whether they will be attending the reception on Wednesday on the sign in sheet and whether they will be bringing a guest.

- When uploading files, make sure they are in Word format and the file is named as follows:

  (Item Number) (Person) (Upload Date)

- Members were reminded that all items must be approved by the July 2018 meeting in order to make it into the 2019 Edition of the NBIC.

4. **Adoption of the Agenda**

- New Action Item added of 18-26

- Presentation - Mark Novak from NuCO2 gave a presentation and held discussions on how the NBIC CO2 detection requirements are causing confusion in the industry.

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

5. Approval of the Minutes of July 18th, 2017 Meeting

There was a motion to approve the Minutes of July 18, 2017 as published. The motion was unanimously approved.

6. Review of Rosters

a. Membership Nominations

- Joseph Brockman and Ken Watson to SG Installation.

  Each individual gave a summary of their experience. A majority vote was taken and unanimously approved.

b. Membership Reappointments

- There are no members eligible for reappointment to SG Installation.

7. Open PRD Items Related to Installation

NB14-0602A	Update index in Part 1 relating to pressure relief devices – D. DeMichael (PM)
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)
NB17-0401	Valve drain plug recommendations for shipping – K. Beise (PM)
NB17-0404	Add paragraphs g) - j) in Part 4, 2.3.6 to Part 1, S5.7.6 – No task group
17-115	Complete rewrite of Section 2 combining common requirements into a general requirements section for all pressure relief devices – A. Renaldo (PM)
17-117	Clarify definition of properly vented in Part 4, 2.2.1 g) – R.McCaffrey (PM)
17-118	Provide metric equivalent and possibly express conversion as formula instead of paragraph – B. Nutter (PM)
17-119	Part 4, 2.2.5 states that pressure setting may exceed 10% range. Clarify by how much – T. Patel (PM)
17-120	Add changeover valve definition in glossary and remove definition from Part 4, 2.2.10 d) – A. Renaldo (PM)
17-122	Minor wording updates in Part 4, 2.3.6 g) – T. Patel (PM)
17-126	Add description of valve capacity calculation using maximum output method – D. Marek (PM)
17-128	Fix contradiction between Part 4, 2.4.1.6 a) and 2.4.4.3 regarding Y bases. – B. Nutter (PM)
17-131	Preface by Part 4, 2.5.7 a) with the phrase “Unless otherwise protected” – J. Ball (PM)

It was announced that a member from Part 4 would be in attendance in the SC meeting to give an update on each of the above items and to take any questions and or concerns from our group. This was not possible so we were informed of the items that Part 4 has approved proposals for. Those proposals are available for our group to view on the cloud in the PRD folder. The Items were NB14-0602A, 17-117, 17-118, and 17-120.

8. NBIC Business

a. Interpretations

There are no interpretations for SG Installation.

b. Action Items – Old Business

Item Number: NB12-0302	**NBIC Location: Part 1**	**No Attachment**
General Description: Add installation requirements for pressure vessels for human occupancy (PVHOs) **Subgroup:** Installation **Task Group:** B. Moore (PM), T. Creacy, T. Millette, M. Richards **Meeting Action:** Progress Report - The task group held a breakout session to further discuss the feedback that was received from Parts 2 and 3. The task group continues to research and hold discussions concerning PVHOs with hopes of having a proposal to present and approve in the July 2018 meeting.		

Item Number: NB14-0403	**NBIC Location: Part 1**	**No Attachment**
General Description: Identify terms from Part 1 that need to be added to the index **Subgroup:** Installation **Task Group:** B. Moore (PM), M. Richards, T. Creacy, M. Washington **Meeting Action:** Progress Report - B. Moore stated that the TG has not identified any further items and therefore would like to keep this item open as a place holder for continual use for items that may be identified in the future.		

Item Number: NB15-0108A	**NBIC Location: Part 1**	**Attachment Pages 2-14**
General Description: Add a supplement to address high temperature hot water boilers **Subgroup:** Installation **Task Group:** M. Wadkinson (PM), B. Moore, T. Creacy, D. Patten **Meeting Action:** Proposal - A breakout session was held amongst the TG to discuss the revised proposal that M. Wadkinson had put together, as a result of the comments and concerns received. The revised proposal was presented to the SG and discussions took place. A motion was made to approve the revised proposal to the SC. The motion was unanimously approved.		

Item Number: NB16-0101	NBIC Location: Part 1	Attachment Pages 15-16

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

Subgroup: Installation

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

Meeting Action: Proposal - E. Wiggins presented a proposal to the SG. After discussions it was decided to have a breakout session amongst the TG to discuss this proposal and to take into consideration the feedback that was received from Mr. Amato. D. Patten was invited to this breakout session. E. Wiggins presented a revised proposal to the SG and discussions took place. A motion was made to approve the revised proposal to the SC. The motion was unanimously approved.

After discussions it was decided that a new action item was needed to address the commissioning of new equipment for proper combustion. New Action Item 18-2 was assigned.

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

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

Subgroup: Installation

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

Meeting Action: Progress Report - A breakout session was held amongst the TG to discuss the topic at hand. A progress report was presented summarizing discussions from the breakout session. The TG will have a complete proposal to present and approve in the SC meeting.

Item Number: 17-133	NBIC Location: Part 1, 3.5.3.2	Attachment Page 17

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

Subgroup: Installation

Task Group: R. Smith (PM), T. Creacy, B. Moore, P. Schuelke

Meeting Action: Proposal - R. Smith presented a proposal to the SG and discussions took place. A motion was made to approve the proposal to the SC. The motion was unanimously approved.

Item Number: 17-147	NBIC Location: Part 1, Section 9	Attachment Pages 18-21

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

Subgroup: Installation

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

Meeting Action: Proposal - R. Austin presented a proposal to the SG and discussions took place. The Letter Ballot was still open until 1/13/2018. Discussions took place addressing the 3 disapproves. The proposal was revised and presented to the SG. A motion was made to approve the proposal to the SC. The motion was unanimously approved. This item is dependent on item 17-159.

Item Number: 17-148	NBIC Location: Part 1	No Attachment
General Description: Vessel initial and installation inspections **Subgroup:** SG Installation **Task Group:** R. Smith (PM), T. Creacy, E. Wiggins, and M. Richards **Meeting Action:** Progress Report - **A** TG of R. Smith (PM), T. Creacy, E. Wiggins, and M. Richards has been assigned. The TG will meet with Mr. Riley.		

Item Number: 17-159	NBIC Location: Part 1, 4.7	No Attachment
General Description: Result of 17-147; review Part 1, 4.7 for references to hot water storage tanks **Subgroup:** SG Installation **Task Group:** J. Brockman (PM), D. Patten, and E. Wiggins **Meeting Action:** Progress Report - A TG of J. Brockman (PM), D. Patten, and E. Wiggins has been assigned.		

c. Action Items – New Business

Item Number: 18-1	NBIC Location: 2.8.1 and 2.8.5	Attachment Pages 22-23
General Description: Review 2.8.1 and 2.8.5 for potential duplication of paragraphs. **Subgroup:** Installation **Task Group:** M. Wadkinson (PM) and D. Patten **Meeting Action:** A TG was assigned of M. Wadkinson (PM), and D. Patten		

Item Number: 18-2	NBIC Location: Part 1	Attachment Page 24
General Description: Result of NB16-0101, add verbiage regarding commissioning fired boilers & fired pressure vessels with a calibrated combustion analyzer. **Subgroup:** Installation **Task Group:** E. Wiggins (PM), D. Patten, P. Schuelke, and M. Wadkinson **Meeting Action:** After discussions in reference to item NB16-0101 it was decided that a new action item was needed to address the commissioning of new equipment for proper combustion. A TG of E. Wiggins (PM), D. Patten, P. Schuelke, and M. Wadkinson has been assigned.		

Item Number: 18-26	NBIC Location:	Attachment Pages 25-26
General Description: **Subgroup:** Installation **Task Group:** R. Smith (PM), B. Moore, J. Brockman. **Meeting Action:** A TG was assigned of R. Smith (PM), B. Moore, J. Brockman.		

- Presentation - Mark Novak from NuCO2 gave a presentation and held discussions on how the NBIC CO2 detection requirements are causing confusion in the industry. **(Attachment pages 27-60)**

9. Future Meetings

- July 16th-19th, 2018 – Columbus, Ohio
- January 14th-17th – Location TBD

10. Adjournment

A motion was made and unanimously approved to adjourn the meeting at 2:40 p.m.

Respectfully submitted,

Jeanne Bock
NBIC Part 1 Secretary

SG Installation Attendance Sheet - 1/9/18

Name	Company	Phone Number	Email	Signature	Attend Reception?	Bringing Guest?
Melissa Wadkinson	Fulton Thermal	(315) 298-7112	melissa.wadkinson@fulton-management.com ~~melissa.wadkinson@fulton.com~~		✓	
Don Patten	Bay City Boiler	(510) 786-3711	dpatten@baycityboiler.com		✓	
Jeanne Bock	National Board	(614) 431-3233	jbock@nationalboard.org		✓	
Randy Austin	State of Arizona	(602) 542-1648	randy.austin@azdosh.gov		✓	
Todd Creacy	Zurich Services Corporation	817 403 4601	todd.creacy@zurichna.com		✓	
Geoffrey Halley	ABMA	(636) 394-3483	Gene Tompkins gene@abma ghalleysjr@aol.com			
Stanley Konopacki	NRG Energy	(630) 771-7956	stanley.konopacki@nrgenergy.com			
Joseph Millette	UAB	(205) 975-4091	jmillett@uab.edu			
Brian Moore	Hartford Steam Boiler	(860) 722-5657	brian_moore@hsb.com	✓		
Mike Richards	Southern Company	(205) 992-7111	hmichaelrichards.pe@gmail.com		✓	✓
Paul Schuelke	Weil-McLain	(219) 879-6561	pschuelke@weil-mclain.com		✓	NO
Rex Smith	Authorized Inspection Associates	(281) 751-1150	rsmith@aiallc.org		✓	
Milton Washington	State of New Jersey	(609) 292-2345	milton.washington@dol.nj.gov			
Edward Wiggins	Liberty Mutual	(256) 357-2825	edward.wiggins@libertymutual.com		✓	
Ron Saker	State of SC	803 609 1630	ronndjr@gmail.com		✓	
Joe Brockman	State of Missouri	573 751-8708	Joe.Brockman@dfs.dps.mo.gov		✓	
Ken Watson	ARISE	501 590.6730	Kenneth.Watson @ARISEINC.com		✓	
William Anderson	State MS.		William.anderson@mSDH.state.ms.us			
Rob Smith	ASME PTMD	202 433-8772	robert.c.smith@navy.mil		✓	
Brian Moore	HSB	860 722-5657	brian_moore@hsb.com		✓	

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Supplement XX

High-Temperature Water Boilers

A high-temperature water boiler is a power boiler ~~intended for operation at~~ in which water is heated and operates at a pressures ~~in~~ in excess of ~~exceeding~~ 160 psig (1.1 MPa) and/or temperatures in excess of ~~exceeding~~ 250° (121°C).

In addition to the requirements listed in Part 1, Section I and Part 1, Section 2 for Power Boilers, the requirements below shall apply:

- High-temperature water boilers shall be provided with a means of adding water to the boiler or system while under pressure. ~~(relocate 2.5.1.2 (g))~~
- The recirculating return line for a high-temperature water boiler shall be provided with the stop valve, or valves, required for the main discharge outlet on the boiler. ~~(relocate 2.5.1.4 (j))~~
- Each high-temperature water boiler shall have a drain of NPS 1 (DN25) minimum, which discharges to a safe location. ~~(relocate 2.6.3.1 (c))~~
- Each high-temperature water boiler shall have a temperature gage or other reporting device located to provide an accurate representation of the temperature at or near the boiler outlet. ~~(relocate 2.8.3)~~
- For high-temperature water boilers, safety relief valves shall have a closed bonnet, and valve bodies shall not be constructed of cast iron ~~(2.9.1 (e))~~
- The required relieving capacity in pounds per hour of the safety or safety relief valves on a high-temperature water boiler shall be determined by dividing the maximum output in Btu/hr at the boiler nozzle obtained by the firing of any fuel for which the unit is designed by one thousand. ~~(2.9.1.3)~~
- Discharge piping from pressure relief valves on high-temperature water boilers shall have adequate provisions for water drainage as well as steam venting. ~~(2.9.6 (i))~~
- Piping for high-temperature water boilers shall include provisions for the expansion and contraction of hot-water mains connected to the boiler(s) so there will be no undue strain transmitted to the boiler(s). ~~(3.7.9.1 (3b))~~
- Expansion tanks, installed in closed loop systems, shall have sufficient volume to handle the required expansion of the total system at the required operating temperature.
    - A low-pressure interlock and a low-water level interlock are recommended.
- It is essential that the pump selection provides the required flow through the boiler, handles the total system head, and be specifically designed to handle water at the required operating temperature. Proof of flow is recommended for forced circulation boilers.
- Each high-temperature water boiler shall be protected from over-temperature by two temperature-operated controls.
    - Each boiler shall have a control that will cut off the fuel supply when the water temperature reaches an operating limit, which shall be less than the maximum allowable temperature.
    - In addition to the above, each high-temperature water boiler shall have a safety limit control with manual reset that will cut off the fuel supply to prevent the water temperature from exceeding the maximum allowable temperature at the boiler outlet.

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Explanation:

A high-temperature water boiler is a power boiler which operates in excess of 160 psig and/or in excess of 250 Deg. F. There are existing references to the requirements for high-temperature water boilers in Part 1, Section 2, however, these references do not stand out in the text. The purpose of this supplement is to take all the references for high-temperature water boilers and locate them in a single supplement. Additionally, new requirements are included to provide more inclusive requirements for proper installation of high-temperature water boilers.

PRD has a related item to provide additional guidance on relief valve discharge piping. When those requirements are finalized, they can be added to this supplement.

Items a) thru g) relocate existing text from Part 1 Section 2

Item is a new requirement using existing text from Part 1 Section 3

Items i) thru k) are new requirements

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SUPPLEMENT XX

HIGH-TEMPERATURE WATER BOILERS

SXX.1 SCOPE

A high-temperature water boiler is a power boiler ~~intended for operation at~~ in which water is heated and operates at a pressures ~~in~~ in excess of ~~exceeding~~ 160 psig (1.1 MPa) and/or temperatures in excess of ~~exceeding~~ 250° (121°C).

SXX.2 INSTALLATION REQUIREMENTS

In addition to the requirements listed in Part 1, Section I and Part 1, Section 2 for Power Boilers, the requirements below shall apply:

a) High-temperature water boilers shall be provided with a means of adding water to the boiler or system while under pressure. ~~(relocate 2.5.1.2 (g))~~

b) The recirculating return line for a high-temperature water boiler shall be provided with the stop valve, or valves, required for the main discharge outlet on the boiler. ~~(relocate 2.5.1.4 (j))~~

c) Each high-temperature water boiler shall have a drain of NPS 1 (DN25) minimum, which discharges to a safe location. ~~(relocate 2.6.3.1 (c))~~

d) Each high-temperature water boiler shall have a temperature gage or other reporting device located to provide an accurate representation of the temperature at or near the boiler outlet. ~~(relocate 2.8.3)~~

e) For high-temperature water boilers, safety relief valves shall have a closed bonnet, and valve bodies shall not be constructed of cast iron. ~~(2.9.1 (e))~~

f) The required relieving capacity in pounds per hour of the safety or safety relief valves on a high-temperature water boiler shall be determined by dividing the maximum output in Btu/hr at the boiler nozzle obtained by the firing of any fuel for which the unit is designed by one thousand. ~~(2.9.1.3)~~

g) Discharge piping from pressure relief valves on high-temperature water boilers shall have adequate provisions for water drainage as well as steam venting. ~~(2.9.6 (i))~~

h) Piping for high-temperature water boilers shall include provisions for the expansion and contraction of hot-water mains connected to the boiler(s) so there will be no undue strain transmitted to the boiler(s). ~~(3.7.9.1 (3b))~~

i) Expansion tanks, ~~installed in closed loop systems,~~ shall have sufficient volume to handle the required expansion of the total system at the required operating temperature.

    1) A low-pressure interlock and a low-water level interlock are recommended.

j) It is essential that the pump selection provides the required flow through the boiler, handles the total system head, and be specifically designed to handle water at the required operating temperature. Proof of flow is recommended for forced circulation boilers.

k) Each high-temperature water boiler shall be protected from over-temperature by two temperature-operated controls.

    1) Each boiler shall have a control that will cut off the fuel supply when the water temperature reaches an operating limit, which shall be less than the maximum allowable temperature.

    2) In addition to the above, each high-temperature water boiler shall have a safety limit control with manual reset that will cut off the fuel supply to prevent the water temperature from exceeding the maximum allowable temperature at the boiler outlet.

2.4.2 LADDERS AND RUNWAYS (17)

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

2.4.3 DRAINS

At least one floor drain shall be installed in the equipment room.

2.4.4 WATER (CLEANING)

A convenient water supply shall be provided for flushing out the boiler and its appurtenances, adding water to the boiler while it is not under pressure, and cleaning the equipment room floor.

2.5 SOURCE REQUIREMENTS

2.5.1 FEEDWATER

2.5.1.1 VOLUME

The source of feedwater shall be capable of supplying a sufficient volume of water as determined by the boiler manufacturer in order to prevent damage to the boiler when all the safety relief valves are discharging at full capacity.

2.5.1.2 CONNECTION

a) To prevent thermal shock, feedwater shall be introduced into a boiler in such a manner that the water will not be discharged directly against surfaces exposed to high temperature gases or to direct radiation from the flame.

b) For boiler operating pressures of 400 psig (2.8 MPa) or higher, the feedwater inlet through the drum shall be fitted with shields, sleeves, or other suitable means to reduce the effects of temperature differentials in the shell or head.

c) Feedwater other than condensate return shall not be introduced through the blowoff.

d) Boilers having more than 500 sq. ft. (46.5 sq. m) of water heating surface shall have at least two means of supplying feedwater. For boilers that are fired with solid fuel not in suspension, and boilers whose setting or heat source can continue to supply sufficient heat to cause damage to the boiler if the feedwater supply is interrupted, one such means of supplying feedwater shall not be subject to the same interruption as the first method. Boilers fired by gaseous, liquid, or solid fuel in suspension may be equipped with a single means of supplying feedwater, provided means are furnished for the immediate removal of heat input if the supply of feedwater is interrupted.

e) For boilers having a water heating surface of not more than 100 sq. ft. (9 sq. m), the feedwater piping and connection to the boiler shall not be smaller than NPS 1/2 (DN 15). For boilers having a water heating surface more than 100 sq. ft. (9 sq. m), the feedwater piping and connection to the boiler shall not be less than NPS 3/4 (DN 20).

f) Electric boiler feedwater connections shall not be smaller than NPS 1/2 (DN 15).

~~g) High-temperature water boilers shall be provided with means of adding water to the boiler or system while under pressure.~~

(17) **2.5.1.3 PUMPS**

a) Boiler feedwater pumps shall have discharge pressure in excess of the highest set pressure relief valve in order to compensate for frictional losses, entrance losses, regulating valve losses, and normal static head, etc. Each source shall be capable of supplying feedwater to the boiler at a minimum pressure of 3% higher than the highest setting of any pressure relief valve on the boiler proper. Detailed engineering evaluation of the pump selection shall be performed and available. Table 2.5.1.3 is a guideline for estimating feedwater pump differential.

b) For forced-flow steam generators with no fixed steam or water line, each source of feedwater shall be capable of supplying feedwater to the boiler at a minimum pressure equal to the expected maximum sustained pressure at the boiler inlet corresponding to operation at maximum designed steaming capacity with maximum allowable pressure at the superheater outlet.

c) Control devices may be installed on feedwater piping to protect the pump against overpressure.

TABLE 2.5.1.3
GUIDE FOR FEEDWATER PUMP DIFFERENTIAL

Boiler Pressure		Boiler Feedwater Pump Discharge Pressure	
psig	(MPa)	psig	(MPa)
200	(1.38)	250	(1.72)
400	(2.76)	475	(3.28)
800	(5.52)	925	(6.38)
1,200	(8.27)	1,350	(9.31)

2.5.1.4 VALVES

a) The feedwater piping shall be provided with a check valve and a stop valve. The stop valve shall be located between the check valve and the boiler.

b) When two or more boilers are fed from a common source, there shall also be a globe or regulating valve on the branch to each boiler located between the check valve and the feedwater source.

c) When the feedwater piping is divided into branch connections and all such connections are equipped with stop and check valves, the stop and check valve in the common source may be omitted.

d) On single boiler-turbine unit installations, the boiler feedwater stop valve may be located upstream from the boiler feedwater check valve.

e) If a boiler is equipped with duplicate feedwater supply arrangements, each such arrangement shall be equipped as required by these rules.

f) A check valve shall not be a substitute for a stop valve.

g) A combination feedwater stop-and-check valve in which there is only one seat and disk and a valve stem is provided to close the valve when the stem is screwed down shall be considered only as a stop valve, a separate check valve shall be installed.

h) Whenever globe valves are used on feedwater piping, the inlet shall be under the disk of the valve.

i) Stop valves and check valves shall be placed on the inlet of economizers or feedwater-heating devices.

j) ~~The recirculating return line for a high temperature water boiler shall be provided with the stop valve, or valves, required for the main discharge outlet on the boiler.~~

2.5.2 FUEL (17)

See NBIC Part 1, Section 1.6.5, *Fuel.*

2.5.3 ELECTRICAL

A disconnecting means capable of being locked in the open position shall be installed at an accessible location at the boiler so that the boiler can be disconnected from all sources of potential. This disconnecting means shall be an integral part of the boiler or adjacent to it.

2.5.3.1 WIRING

All wiring for controls, heat generating apparatus, and other appurtenances necessary for the operation of the boiler or boilers should be installed in accordance with the provisions of national or international standards and comply with the applicable local electrical codes.

2.5.3.2 REMOTE EMERGENCY SHUTDOWN SWITCHES (17)

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

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

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

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

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

2.5.3.3 CONTROLS AND HEAT-GENERATING APPARATUS

a) Oil and gas-fired and electrically heated boilers shall be equipped with suitable primary (flame safeguard) safety controls, safety limit switches and controls, and burners or electric elements as required by a nationally or internationally recognized standard.

b) The symbol of the certifying organization that has investigated such equipment as having complied with a nationally recognized standard shall be affixed to the equipment and shall be considered as evidence that the unit was manufactured in accordance with that standard.

c) These devices shall be installed in accordance with jurisdictional and environmental requirements, manufacturer's recommendations, and/or industry standards, as applicable.

(17) **2.5.4 VENTILATION AND COMBUSTION AIR**

See NBIC Part 1, Section 1.6.6, *Ventilation and Combustion Air.*

(17) **2.5.5 LIGHTING**

See NBIC Part 1, Section 1.6.7, *Lighting.*

2.5.6 EMERGENCY VALVES AND CONTROLS

All emergency shut-off valves and controls shall be accessible from a floor, platform, walkway, or runway. Accessibility shall mean within a 6 ft. (1.8 m) elevation of the standing space and not more than 12 in. (305 mm) horizontally from the standing space edge.

2.6 DISCHARGE REQUIREMENTS

(17) **2.6.1 CHIMNEY OR STACK**

See NBIC Part 1, Section 1.6.8, *Chimney or Stack.*

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.

2.6.3 DRAINS

2.6.3.1 CONNECTION

a) Each boiler shall have at least one drain pipe fitted with a stop valve at the lowest point of the boiler. If the connection is not intended for blowoff purposes, a single valve is acceptable if it can be locked in the closed position or a blank flange can be installed downstream of the valve. If the connection is intended for blowoff purposes, requirements of NBIC Part 1, 2.7.5 shall be followed.

~~b) For high-temperature water boilers, the minimum size of the drain pipe shall be NPS 1 (DN 25).~~

b) ~~c)~~ Drain pipes, valves, and fittings within the same drain line shall be the same size.

c) ~~d)~~ The discharge from the drain shall be piped to a safe location.

2.6.3.2 PRESSURE RATING

Drain piping from the drain connection, including the required valve(s) or the blanked flange connection, shall be designed for the temperature and pressure of the drain connection. The remaining piping shall be designed for the expected maximum temperature and pressure. Static head and possible choked flow conditions shall be considered. In no case shall the design pressure and temperature be less than 100 psig (700 kPa) and 220°F (104°C), respectively.

2.6.3.3 PARTS

a) When parts (e.g., economizers, etc.) are installed with a stop valve between the part and the boiler or the part cannot be completely drained through the drain on the boiler, a separate drain shall be installed

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~~ 2.8.3 PRESSURE CONTROL (17)

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~~ 2.8.4 AUTOMATIC LOW-WATER FUEL CUTOFF AND/OR WATER FEEDING DEVICE FOR STEAM OR VAPOR SYSTEM BOILERS (17)

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

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

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

d) Fuel cutoffs and water feeding devices embodying a separate chamber shall have a vertical drain pipe, extended to a safe point of discharge, and a blowoff valve not less than NPS 3/4 (DN 20), located at the

lowest point in the water equalizing pipe connections so that the chamber and the equalizing pipe can be flushed and the device tested.

2.9 PRESSURE RELIEF VALVES

(17) 2.9.1 VALVE REQUIREMENTS – GENERAL

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

b) Safety relief valves are valves designed to relieve either steam or water, depending on the application.

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

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

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

e) ~~f)~~ 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) ~~g)~~ 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 properly vented and arranged to permit servicing and normal operation of the valve.

2.9.1.1 NUMBER

At least one National Board capacity certified pressure relief valve shall be installed on the boiler. If the boiler has more than 500 ft^2. (46.5 m^2) of heating surface, or if an electric boiler has a power input of more than 3.76 million Btu/hr (1,100 kW), two or more National Board capacity certified pressure relief valves shall be installed.

2.9.1.2 LOCATION

a) Pressure relief valves shall be placed on, or as close as physically possible to, the boiler proper.

b) Pressure relief valves shall not be placed on the feedline.

c) Pressure relief valves shall be connected to the boiler independent of any other connection without any unnecessary intervening pipe or fittings. Such intervening pipe or fittings shall not be longer than the face-to-face dimension of the corresponding tee fitting of the same diameter and pressure rating as listed in the applicable standards.

(17) 2.9.1.3 CAPACITY

a) The pressure relief valve capacity for each boiler shall be such that the valve or valves will discharge all the steam that can be generated by the boiler without allowing the pressure to rise more than 6% above the highest pressure at which any valve is set and in no case to more than 6% above the maximum allowable working pressure of the boiler.

b) The minimum relieving capacity for other than electric boilers and forced-flow steam generators with no fixed steam line and waterline shall be estimated for the boiler and waterwall heating surfaces as given

in NBIC Part 1, Table 2.9.1.3, but in no case shall the minimum relieving capacity be less than the maximum designed steaming capacity as determined by the manufacturer.

~~e) The required relieving capacity in pounds per hour of the pressure relief valves on a high temperature water boiler shall be determined by dividing the maximum output in Btu at the boiler nozzle obtained by the firing of any fuel for which the unit is designed by one thousand.~~

c) ~~d)~~ The minimum pressure relief valve relieving capacity for electric boilers shall not be less than 3.5 lbs/hr/kW (1.6 kg/hr/kW) input.

d) ~~e)~~ If the pressure relief valve capacity cannot be computed, or if it is desirable to prove the computations, it should be checked by any one of the following methods; and if found insufficient, additional relieving capacity shall be provided:

1) By performing an accumulation test, that is, by shutting off all other steam discharge outlets from the boiler and forcing the fires to the maximum. This method should not be used on a boiler with a superheater or reheater, or on a high-temperature water boiler;

2) By measuring the maximum amount of fuel that can be burned and computing the corresponding evaporative capacity upon the basis of the heating value of the fuel;

3) By determining the maximum evaporative capacity by measuring the feedwater. The sum of the pressure relief valve capacities marked on the valves shall be equal to or greater than the maximum evaporative capacity of the boiler. This method should not be used on high-temperature water boilers.

TABLE 2.9.1.3

MINIMUM POUNDS OF STEAM PER HOUR PER SQUARE FOOT OF HEATING SURFACE

lb steam/hr ft^2 (kg steam/hr m^2)

	Firetube Boiler	Watertube Boiler
Boiler Heating Surface		
Hand-fired	5 (24)	6 (29)
Stoker-fired	7 (34)	8 (39)
Oil, gas, or pulverized coal	8 (39)	10 (49)
Waterwall Heating Surface		
Hand-fired	8 (39)	8 (39)
Stoker-fired	10 (49)	12 (59)
Oil, gas, or pulverized coal	14 (68)	16 (78)
Copper-finned Watertubes		
Hand-fired		4 (20)
Stoker-fired		5 (24)
Oil, gas, or pulverized coal		6 (29)

Notes:

- When a boiler is fired only by a gas having a heat value not in excess of 200 Btu/ft.^{3}(7.5MJ/m^3), the minimum relieving capacity should be based on the values given for hand-fired boilers above.
- The heating surface shall be computed for that side of the boiler surface exposed to the products of combustion, exclusive of the superheating surface. In computing the heating surface for this purpose only the tubes, fireboxes, shells, tubesheets, and the projected area of headers need to be considered, except that for vertical firetube steam boilers, only that portion of the tube surface up to the middle gage cock is to be computed.
- For firetube boiler units exceeding 8,000 Btu/ft.^{2} (9,085 J/cm.^{2}) (total fuel Btu (J) Input divided by total heating surface), the factor from the table will be increased by 1 (4.88) for every 1,000 Btu/ft.^{2} (1,136 J/cm.^{2}) above 8,000 Btu/ft.^{2} (9,085 J/cm.^{2}) For units less than 7,000 Btu/ft.^{2} (7,950 J/cm.^{2}), the factor from the table will be decreased by 1 (4.88).
- For watertube boiler units exceeding 16,000 Btu/ft.^{2} (18,170 J/cm.^{2})(total fuel Btu input divided by the total heating surface) the factor from the table will be increased by 1 (4.88) for every 1,000 Btu/ft.^{2} (1,136 J/cm.^{2}) above 16,000 Btu/ft.^{2} (18,170 J/cm.^{2}). For units with less than 15,000 Btu/ft.^{2} (17,034 J/cm.^{2}), the factor in the table will be decreased by 1 (4.88) for every 1,000 Btu/ft.^{2} (1,136 J/cm.^{2}) below 15,000 Btu/ft.^{2} (17,034 J/cm.^{2}).

2.9.1.4 SET PRESSURE

One or more pressure relief valves on the boiler proper shall be set at or below the maximum allowable working pressure. If additional valves are used, the highest pressure setting shall not exceed the maximum allowable working pressure by more than 3%. The complete range of pressure settings of all the pressure relief valves on a boiler shall not exceed 10% of the highest pressure to which any valve is set. Pressure setting of pressure relief valves on high temperature water boilers may exceed this 10% range.

c) Every independently fired superheater that may be shut off from the boiler and permit the superheater to become a fired pressure vessel shall have one or more pressure relief valves having a discharge capacity equal to 6 pounds of steam per hr/ft.^{2} (29 kg per hr per sq. m) of superheater surface measured on the side exposed to the hot gases.

d) Every pressure relief valve used on a superheater discharging superheated steam at a temperature over 450°F (230°C) shall have a casing, including the base, body, bonnet, and spindle constructed of steel, steel alloy, or equivalent heat-resistant material. The valve shall have a flanged inlet connection or a welded-end inlet connection. The seat and disk shall be constructed of suitable heat-erosive and corrosive-resistant material, and the spring fully exposed outside of the valve casing so that it is protected from contact with the escaping steam.

(17) 2.9.4 ECONOMIZERS

An economizer that can not be isolated from a boiler does not require a pressure relief valve. Economizers that can be isolated from a boiler or other heat transfer device, allowing the economizer to become a fired pressure vessel, shall have a minimum of one pressure relief valve. Discharge capacity, rated in lbs/hr (kg/hr), of the pressure relief valve or valves shall be calculated from the maximum expected heat absorption rate in Btu/hr (W) of the economizer, and will be determined from manufacturer data, divided by 1,000 Btu/lb (2,326kJ/kg). The pressure relief valve shall be installed in a location recommended by the manufacturer, when no recommendation exists the location shall be as close as practical to the economizer outlet.

(17) 2.9.5 PRESSURE-REDUCING VALVES

a) Where pressure-reducing valves are used, one or more pressure relief valves shall be installed on the low pressure side of the reducing valve in those installations where the piping or equipment on the low pressure side does not meet the requirements for the steam supply piping.

b) The pressure relief valves shall be located as close as possible to the pressure-reducing valve.

c) Capacity of the pressure relief valves shall not be less than the total amount of steam that can pass from the high pressure side to the low pressure side and be such that the pressure rating of the lower pressure piping or equipment shall not be exceeded.

d) The use of hand-controlled bypasses around reducing valves is permissible. The bypass around a reducing valve may not be greater in capacity than the reducing valve unless the piping or equipment is adequately protected by pressure relief valves or meets the requirements of the high pressure system.

e) See Supplement 2 for additional information on the calculation of the required capacity of pressure relief valves installed after pressure-reducing valves.

(17) 2.9.6 INSTALLATION AND DISCHARGE REQUIREMENT

a) Every boiler shall have outlet connections for the pressure relief valve, or valves, independent of any other outside steam connection, the area of opening shall be at least equal to the aggregate areas of inlet connections of all of the attached pressure relief valves. An internal collecting pipe, splash plate, or pan should be used, provided the total area for inlet of steam is not less than twice the aggregate areas of the inlet connections of the attached pressure relief valves. The holes in such collecting pipes shall be at least 1/4 in. (6 mm) in diameter, and the least dimension in any other form of opening for inlet of steam shall be 1/4 in. (6 mm). If pressure relief valves are attached to a separate steam drum or dome, the opening between the boiler proper and the steam drum or dome shall be not less than 10 times the total area of the pressure relief valve inlet.

b) Every pressure relief valve shall be connected so as to stand in an upright position with spindle vertical.

c) The opening or connection between the boiler and the pressure relief valve shall have at least the area of the valve inlet and the inlet pipe to the pressure relief valve shall be as short and straight as possible, no longer than twice the center-to-end (face) dimension of a corresponding tee fitting of the same diameter, pressure class, and connection type. When a discharge pipe is used, the cross-sectional area shall not be less than the full area of the valve outlet or of the total of the areas of the valve outlets. It shall be as short and straight as possible and arranged to avoid undue stresses on the valve or valves.

d) No valves of any type except a changeover valve as defined below, shall be placed between the pressure relief valves and the boiler, nor on the discharge pipe between the pressure relief valves and the atmosphere.

A changeover valve, which allows two redundant pressure relief valves to be installed for the purpose of changing from one pressure relief valve to the other while the boiler is operating, may be used provided the changeover valve is in accordance with the original code of construction. It is recommended that the Jurisdiction be contacted to determine the acceptability of changeover valves on boiler applications. The changeover valve shall be designed such that there is no intermediate position where both pressure relief valves are isolated from the boiler.

e) When two or more pressure relief valves are used on a boiler, they should be mounted either separately or as twin valves made by placing individual valves on Y-bases, or duplex valves having two valves in the same body casing. Twin valves made by placing individual valves on Y-bases or duplex valves having two valves in the same body shall be of equal size.

f) When two valves of different sizes are installed singly, the relieving capacity of the smaller valve shall not be less than 50% of that of the larger valve.

g) When a boiler is fitted with two or more pressure relief valves on one connection, this connection to the boiler shall have a cross-sectional area not less than the combined areas of inlet connections of all the pressure relief valves with which it connects.

h) All pressure relief valves shall be piped to a safe point of discharge so located or piped as to be carried clear from running boards or platforms. Provision for an ample gravity drain shall be made in the discharge pipe at or near each pressure relief valve, and where water or condensation may collect. Each valve shall have an open gravity drain through the casing below the level of the valve seat. For iron- and steel-bodied valves exceeding NPS 2 (DN 50), the drain hole shall be tapped not less than NPS 3/8 (DN 10).

~~i) Discharge piping from pressure relief valves on high-temperature water boilers shall have adequate provisions for water drainage as well as steam venting.~~

i) ~~j)~~ If a muffler is used on a pressure relief valve, it shall have sufficient outlet area to prevent back pressure from interfering with the proper operation and discharge capacity of the valve. The muffler plates or other devices shall be so constructed as to avoid a possibility of restriction of the steam passages due to deposits. Mufflers shall not be used on high-temperature water boiler pressure relief valves.

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.

Item Number: NB16-0101	NBIC Location: Part 1	No Attachment
General Description: Result of NB13-1101, address carbon monoxide sensors in equipment rooms **Subgroup:** Installation **Task Group:** E. Wiggins (PM), G. Halley, S. Konopacki, T. Creacy, T. Millette, B. Moore, P. Schuelke, R. Smith, M. Washington **History:** The task group is working to develop a proposal to present to the committee in January 2018.		

While the requirement of CO sensors in equipment rooms is generally covered by the NFPA, Fire Code, Local Building and Mechanical codes, I believe we would be remiss by not addressing this issue in the NBIC. It is my proposal to add a paragraph to **Part 1, Section 1,** to address CO sensors in equipment rooms.

1.6.X Carbon Monoxide (CO) Detector/Alarm

The owner-user shall install a carbon monoxide (CO) detector(s)/alarm(s) in equipment rooms where any boilers are located in accordance with the authority having Jurisdiction.

Item Number: NB16-0101	NBIC Location: Part 1	No Attachment
General Description: Result of NB13-1101, address carbon monoxide sensors in equipment rooms **Subgroup:** Installation **Task Group:** E. Wiggins (PM), G. Halley, S. Konopacki, T. Creacy, T. Millette, B. Moore, P. Schuelke, R. Smith, M. Washington **History:** The task group is working to develop a proposal to present to the committee in January 2018.		

While the requirement of CO sensors in equipment rooms is generally covered by the NFPA, Fire Code, Local Building and Mechanical codes, I believe we would be remiss by not addressing this issue in the NBIC. It is my proposal to insert a new subsection and paragraph in **Part 1, Section 1, 1.6.8 Chimney or Stack** and before **1.6.9 Final Acceptance** to address CO sensors in equipment rooms.

1.6.9 Carbon Monoxide (CO) Detector/Alarm

The owner or user shall install a carbon monoxide (CO) detector/alarm in equipment rooms where fuel fired boilers and/or fuel fired pressure vessels are located in accordance with the authority having Jurisdiction.

3.5.3.1 STEAM HEATING, HOT WATER HEATING, AND HOT WATER SUPPLY BOILERS

d) If the equipment room door is on the building exterior, the switch ~~shall~~ should be located just inside the door. If there is more than one door to the equipment room, there ~~shall~~ should be a switch located at each door of egress.

3.5.3.2 POTABLE WATER HEATERS

d) If the equipment room door is on the building exterior, the switch ~~shall~~ should be located just inside the door. If there is more than one door to the equipment room, there ~~shall~~ should be a switch located at each door of egress.

S5.5.7 ELECTRICAL

d) If the equipment room door is on the building exterior, the shutdown switch ~~shall~~ should be located just inside the door. If there is more than one door to the equipment room, there ~~shall~~ should be a shutdown switch located at each door of egress. For atmospheric-gas burners, and oil burners where a fan is on a common shaft with the oil pump, the complete burner and controls should be shut off. For power burners with detached auxiliaries, only the fuel input supply to the firebox need be shut off.

17-147 Austin 1-9-18

Add definition of potable water storage tank to the glossary

Potable Water Storage Tank - an unfired pressure vessel used to store potable hot water at temperatures ~~less than~~ not exceeding 210°F (99°C). ~~The heat for the tank may be from an internal coil or external source.~~

17-147-MC

Ballot Description :

Please cast your ballot on this item regarding the definition of hot water storage tanks. The ballot deadline is January 5th.

17-147 SC Installation 7-19-17.docx

Start Date:12-5-17 **End Date:**01-13-18

View Comments

Comments for Ballot: 17-1-47	
Morelock,Brian voted: Approve 1/4/2018 8:32:44 PM	The determination of whether a storage tank (or vessel) is a boiler or potable water storage tank comes from scope and service restrictions in Article 1 of Section IV, Part PG Service Limitations in Section I, and U-1 Scope in Section VIII, Division 1. The Jurisdiction of Tennessee uses ASME Code definitions in Rule 0800-03-03-.01 Definitions. The Code references were recently added to these definitions. In Tennessee, potable water heaters, including instantaneous water heaters, with a heat input of between 100,000 and 199,999 BTU/hr are not required to be built to ASME Code, but are subject to registration, inspection and inspection certificate requirements. Potable water heaters with a heat input of 200,000 BTU/hr and greater are are required to be built to ASME Code and are subject to registration, inspection and inspection certificate requirements.
Hopkins,Craig voted: Disapprove 1/4/2018 6:59:24 PM	I am also not comfortable with the last sentence.
Troutt,Robby voted: Disapprove 1/3/2018 5:38:16 PM	My concern is the lack of adding a btu/hr max of the heat source. If the heat source is above 200,000 bru/hr, then this is considered to be a Potable Water Heater in Texas.
Austin,Randy voted: Approve 1/3/2018 10:35:47 AM	I have inspected thousands of potable hot water storage tanks with a heat source from both an internal coil and external source constructed per ASME Code HLW, and Section VIII, Div.1, also many non-Code constructed potable hot water storage tanks. Never encountered one that would be considered a boiler by this definition.
Wadkinson,Melissa voted: Disapprove 1/3/2018 8:44:39 AM	I would like to hear more feedback from the Jurisdictions regarding Mr. Troutt's comment.
Troutt,Robby voted: Disapprove 12/14/2017 9:00:52 AM	I think the last sentence should be removed. If a storage tank has a heat source, then it may be considered to be a boiler and not a storage tank, depending on the Jurisdictions definition of a boiler.

Ballot Votes

Name	Email	Votes	Vote Date
Randy Austin	randy.austin@azdosh.gov	Approve	01/03/18
Robby Troutt	rob.troutt@tdlr.texas.gov	Disapprove	01/03/18
Robert Wielgoszinski	Robert_Wielgoszinski@hsbct.com	Not Voted	N/A
Sid Cammeresi	sidneycammeresi@hotmail.com	Approve	12/19/17
Stanley Staniszewski	stanley.staniszewski@dot.gov	Approve	12/08/17
Venus Newton	venus.newton@bpcllcga.com	Approve	01/05/18

12

Comments for Ballot: 17-1-47	
Morelock,Brian voted: Approve 1/4/2018 8:32:44 PM	The determination of whether a storage tank (or vessel) is a boiler or potable water storage tank comes from scope and service restrictions in Article 1 of Section IV, Part PG Service Limitations in Section I, and U-1 Scope in Section VIII, Division 1. The Jurisdiction of Tennessee uses ASME Code definitions in Rule 0800-03-03-.01 Definitions. The Code references were recently added to these definitions. In Tennessee, potable water heaters, including instantaneous water heaters, with a heat input of between 100,000 and 199,999 BTU/hr are not required to be built to ASME Code, but are subject to registration, inspection and inspection certificate requirements. Potable water heaters with a heat input of 200,000 BTU/hr and greater are are required to be built to ASME Code and are subject to registration, inspection and inspection certificate requirements.
Hopkins,Craig voted: Disapprove 1/4/2018 6:59:24 PM	I am also not comfortable with the last sentence.
Troutt,Robby voted: Disapprove 1/3/2018 5:38:16 PM	My concern is the lack of adding a btu/hr max of the heat source. If the heat source is above 200,000 bru/hr, then this is considered to be a Potable Water Heater in Texas.
Austin,Randy voted: Approve 1/3/2018 10:35:47 AM	I have inspected thousands of potable hot water storage tanks with a heat source from both an internal coil and external source constructed per ASME Code HLW, and Section VIII, Div.1, also many non-Code constructed potable hot water storage tanks. Never encountered one that would be considered a boiler by this definition.
Wadkinson,Melissa voted: Disapprove 1/3/2018 8:44:39 AM	I would like to hear more feedback from the Jurisdictions regarding Mr. Troutt's comment.
Troutt,Robby voted: Disapprove 12/14/2017 9:00:52 AM	I think the last sentence should be removed. If a storage tank has a heat source, then it may be considered to be a boiler and not a storage tank, depending on the Jurisdictions definition of a boiler.

Ballot Votes

Name	Email	Votes	Vote Date
Bradley Besserman	bbesserman@nationalboard.org	Not Voted	N/A
Brian Morelock	morelock@eastman.com	Approve	01/04/18
Craig Hopkins	chopkins@seattleboiler.com	Disapprove	01/04/18
Don Cook	dcook@dir.ca.gov	Not Voted	N/A
Gary Scribner	gscribner@nationalboard.org	Not Voted	N/A
George Galanes PE	ggalanes@diamondtechnicalservices.com	Approve	12/08/17
james getter	jim.getter@worthingtonindustries.com	Approve	01/02/18
James Pillow	jpillow@commonarc.com	Approve	12/08/17
Jim Riley	jim.riley@conocophillips.com	Not Voted	N/A
Jim Sekely	jsekely@comcast.net	Approve	12/19/17
Joel Amato	joel.amato@state.mn.us	Not Voted	N/A
John Burpee	john.h.burpee@maine.gov	Not Voted	N/A
Kevin Simmons	kevin.simmons@pentair.com	Not Voted	N/A
Larry McManamon	lmac@qlabap.com	Not Voted	N/A
Mark Mooney	mark.mooney@libertymutual.com	Approve	12/05/17
Melissa Wadkinson	melissa.wadkinson@fulton.com	Disapprove	01/03/18
Michael Richards	Hmichaelrichards.pe@gmail.com	Approve	12/13/17
Michael Webb	mike.webb@xcelenergy.com	Approve	01/05/18
Paul Edwards	edwar1pd@westinghouse.com	Approve	12/19/17
Paul Welch	paul.Welch@ariseinc.com	Approve	01/03/18

action request for a new item
Melissa Wadkinson
to:
JBock
01/09/2018 04:09 PM
Hide Details
From: Melissa Wadkinson <Melissa.Wadkinson@fulton-management.com>
To: JBock <jbock@nationalboard.org>

1 Attachment

action item requestcontrols and gages wadkinson 1-9-17.docx

Jeanne

attached please find the action item request form for the new item we discussed. I can be the PM. Please let me know when you assign the item number. thank you. Melissa

Action Item Request Form

Item Number:	18-1 M. Wadkinson 1-9-18
General Description:	Controls and Gages Review 2.8.1 and 2.8.5 for potential duplication of paragraphs
Subgroup:	SG Installation
Task Group:	M. Wadkinson (PM), D. Patten

Statement of Need

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

Paragraph 2.8.1 entitled Water and paragraph 2.8.5 entitled automatic low water fuel cutoff and/or feeding device for steam or vapor system boilers potentially have duplication of paragraphs. Mr. Amato requests that SG Installation review the two sections and determine if any changes are required.

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.

Fw: NuCO2 Action Item
Melissa Wadkinson
to:
JBock
01/09/2018 04:10 PM
Hide Details
From: Melissa Wadkinson <Melissa.Wadkinson@fulton-management.com>
To: JBock <jbock@nationalboard.org>

1 Attachment

18-26 Novak 1-8-18.docx

for the task group of Mr. Moore, Mr. Smith and Mr. Brockman.

From: Venus Newton <venus.newton@bpcllcga.com>
Sent: Tuesday, January 9, 2018 3:50 PM
To: Melissa Wadkinson
Subject: NuCO2 Action Item

Melissa,
This is the proposal he wants us to work on. I don't have a problem being the Task Group Leader for a joint task group between Part 1 and Part 2. This attachment is in the SG Folder.

Take care,

Venus Newton
President
Boiler & Property Consulting, LLC
Venus.newton@boilerproperty.com
Cell: 404-710-8626

XL Catlin
5018 Bristol Industrial Way
Suite 203
Buford, Georgia 30518
Phone: +1-770-614-3111, Fax: +1-770-614-3116

18-26 Novak 1-8-18

S3.4GAS DETECTION SYSTEMS

Carbon Dioxide gas is colorless and odorless – leakage will not be seen or smelled. Carbon Dioxide gas is 1.5 times heavier than air and therefore if a leak occurs, will tend to accumulate in lower elevations first. Particular caution must be exercised in both poorly ventilated areas, and below ground level locations where an opportunity for the gas to escape is not present: these locations shall have CO2 gas detection equipment installed for safety, and, jurisdictional code may mandate the use of either ventilation or gas detection in these situations.

Thoughtful review and consideration should be exercised when designing the installation of CO2 gas detection systems. Leakage of carbon dioxide gas can migrate through unsealed walls, baseboard, conduit, water drain pipes, cracks or stairwells potentially creating a hazard elsewhere significantly beyond a CO2-use, or CO2 storage area. Designing for optimal, effective location(s) and installation of CO2 Sensors is critical to providing safe gas concentration detection. Also, assuring adequate warning is provided to a potentially hazardous environment with audible/visual indicators (termed Repeaters, Horn/Strobes, etc.) linked to installed sensor(s) at all entrances to areas prior to entering the monitored zone is important. Installing proper instructional signage at appropriate, key locations provides facility personnel with vital information about the safety system.

A continuous gas detection system shall be provided in the room or area where container systems are filled and used, and in areas where piping and equipment indoors are subject to the heavier than air gas ~~can~~ congregating (where leaks of carbon dioxide can accumulate), ~~e~~ and in below grade, enclosed, or confined space outdoor locations. Small outdoor, at-grade enclosures which are not large enough for a person to enter are not required to have gas detection. Carbon dioxide (CO2) sensors shall be provided within 12 inches (305mm) of the floor in the area where the gas is most likely to accumulate or leaks are most likely to occur as a general guide, or as specified by the gas detection manufacturer or local code mandates. Specific code requirements should be verified where the installation takes place and should be reviewed for assured compliance. The system shall be designed to detect and notify at a low level alarm and high level alarm.

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

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

CO2 Company Rep coming to New Orleans
Venus Newton
to:
jim.getter, jmetzmaier
01/06/2018 08:16 AM
Cc:
Melissa.wadkinson, jbock
Hide Details
From: Venus Newton <venus.newton@bpcllcga.com>
To: jim.getter@worthingtonindustries.com, jmetzmaier@nationalboard.org
Cc: Melissa.wadkinson@fulton-management.com, jbock@nationalboard.org

2 Attachments

NBIC PC to Pt 1 Sup 3 and Pt 2 Sup 12 Jan 2018.docx Presentation NBIC DRAFT 2018 January4.pdf

Jim/Jodi,

We need to add these guys to our agenda for Tuesday, under new business I guess. Mark Novak from NuCO2 wants to give a short presentation and discuss how the NBIC CO2 detection requirements are causing confusion in their industry. I've attached the presentation and his proposal for review. Mark was part of the initial group that worked with Scribner to establish the framework we are still working with. He knows more about CO2 tank installations, operations and regulatory issues than anyone else in the country. He knows his stuff and has an understanding of how the code making process works as he is on CGA, Bev-Carb and a bunch of other committees. He is also willing to dedicate the time to work with us through the process. His contact information is below.

I suggest we corrdinate with Part 1 to attend his presentation as well since what he is talking about impacts both Installation and Inspection. Let me know if you need anything else from me. See you next week.

Mark Novak
NuCO2
Director of Engineering, Technical Support & Pressure Vessel and Fire Regulatory
2800 SE Market Place
Stuart, Florida 34997
phone: 772.221.1754 x3502
cell : 772.233.5801
mnovak@nuco2.com

Take care,

Venus Newton
President
Boiler & Property Consulting, LLC
Venus.newton@boilerproperty.com
Cell: 404-710-8626

XL Catlin
5018 Bristol Industrial Way
Suite 203
Buford, Georgia 30518
Phone: +1-770-614-3111, Fax: +1-770-614-3116

8.3 Code Revisions or Additions

Proposed Revision:

2017 National Board Inspection Code Part 1 Supplement 3 S3.4 and Part 2 Supplement 12 S12.5

For Part 1 Supplement 3 S3.4 only:

Carbon Dioxide gas is colorless and odorless – leakage will not be seen or smelled. Carbon Dioxide gas is 1.5 times heavier than air and therefore if a leak occurs, will tend to accumulate in lower elevations first. Particular caution must be exercised in both poorly ventilated areas, and below ground level locations where an opportunity for the gas to escape is not present: these locations shall have CO2 gas detection equipment installed for safety, and, jurisdictional code may mandate the use of either ventilation or gas detection in these situations.
Thoughtful review and consideration should be exercised when designing the installation of CO2 gas detection systems. Leakage of carbon dioxide gas can migrate through unsealed walls, baseboard, conduit, water drain pipes, cracks or stairwells potentially creating a hazard elsewhere significantly beyond a CO2-use, or CO2 storage area. Designing for optimal, effective location(s) and installation of CO2 Sensors is critical to providing safe gas concentration detection. Also, assuring adequate warning is provided to a potentially hazardous environment with audible/visual indicators (termed Repeaters, Horn/Strobes, etc.) linked to installed sensor(s) at all entrances to areas prior to entering the monitored zone is important. Installing proper instructional signage at appropriate, key locations provides facility personnel with vital information about the safety system.

For both Part 1 Supplement 3 S3.4 and Part 2 Supplement 12 S12.5:

A continuous gas detection system shall be provided in the room or area where container systems are filled and used, and in areas where piping and equipment located indoors are subject to the heavier than air gas ~~can~~ congregating (where leaks of carbon dioxide can accumulate), and in below grade or enclosed or confined space outdoor locations. Small outdoor, at-grade enclosures which are not large enough for a person to enter are not required to have gas detection. Carbon dioxide (CO_2) sensors shall be provided within 12 in. (305mm) of the floor in the area where the gas is most likely to accumulate or leaks are most likely to occur as a general guide, or as specified by the gas detection manufacturer or local code mandates. Specific code requirements should be verified where the installation takes place and should be reviewed for assured compliance.

The system shall be designed to detect and notify at a low level alarm and high level alarm.

a) The threshold for activation of the low level alarm shall not exceed a carbon dioxide concentration of 5,000 ppm (9,000 mg/m^3) Time Weighted Average (TWA) over 8 hours

Regulatory Safety Codes Affecting Carbon Dioxide Gas Detection: Code Harmonization?

NuCO2 XACTBEV

NuCO$_2$®

Mark Novak - NuCO$_2$ Director of Engineering, Technical Support & Pressure Vessel and Fire Regulatory

NuCO$_2$ XACTBEV

Who is $NuCO_2$?

NuCO2®

- $NuCO_2$: originally founded in 1990, approximately 1000 employees and 175,000 customer accounts across the United States making over 7,000 deliveries each day from 160+ $NuCO_2$ locations

- Praxair: an American worldwide industrial gas company - 100+ years old comprised of 26,000 employees in 50 countries, an original founding member of The Compressed Gas Association (CGA); March 1, 2013 Praxair completes acquisition of $NuCO_2$

Praxair Core Value #1 (*of 6*): Safety First

http://www.praxair.com/our-company/vision-and-values

NuCO2®

Core Values

Safety First *- A passionate commitment to safety underpins all of our activities. The safety of our products and services, safety at work, safety on the road and safety at home are the highest priorities for our employees, contractors, families and customers.*

Difficulties currently exist employing gas detection safety equipment across the U.S. from conflicting code requirements which are not harmonized…

CO_2 Applications in Restaurants

CO_2 : A Variety Of Uses In The Restaurant & Hospitality Industry

NuCO2®

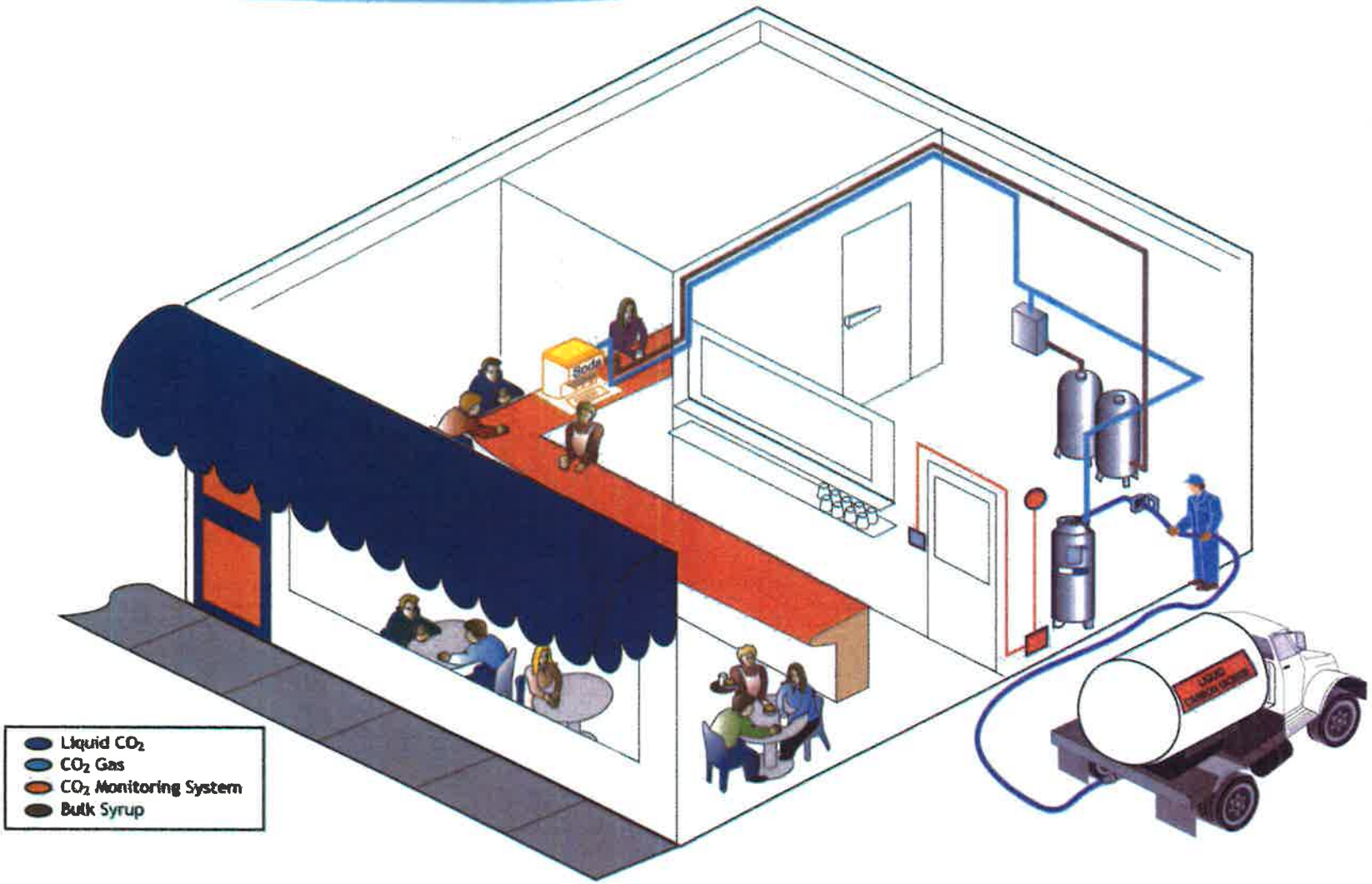
- **Propellant**
  - Drive BIB (syrup) pumps
  - Drive bulk syrup systems
  - Push Draught Beer from the keg to the faucet
  - Push juice, milk shake and mixed drink systems
  - Push condiment systems
  - Operate ABS systems

- **Carbonation**
  - Beverage Grade CO_2 mixes with H_2O inside of a "carbonator" to produce carbonated water that is then mixed with syrup to make soft drinks

- **Automation and robotics** – Drive-thru window actuator

Beverage Carbonation Soda Systems – General Indoor Layout

NuCO2®



NuCO2® XACTBEV® BEVERAGE CARBONATION SOLUTIONS™

Beverage Carbonation Soda Systems – General Indoor Layout

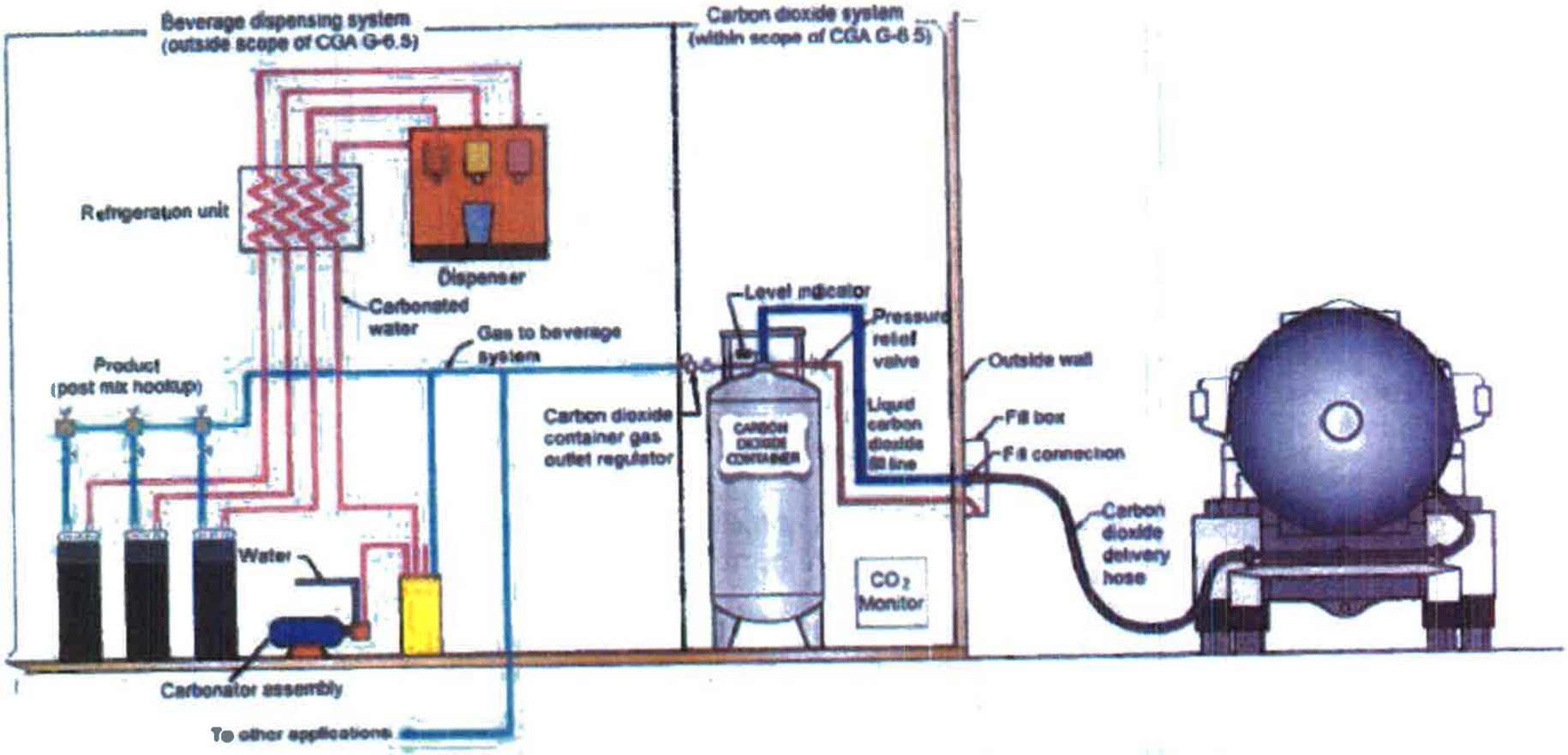
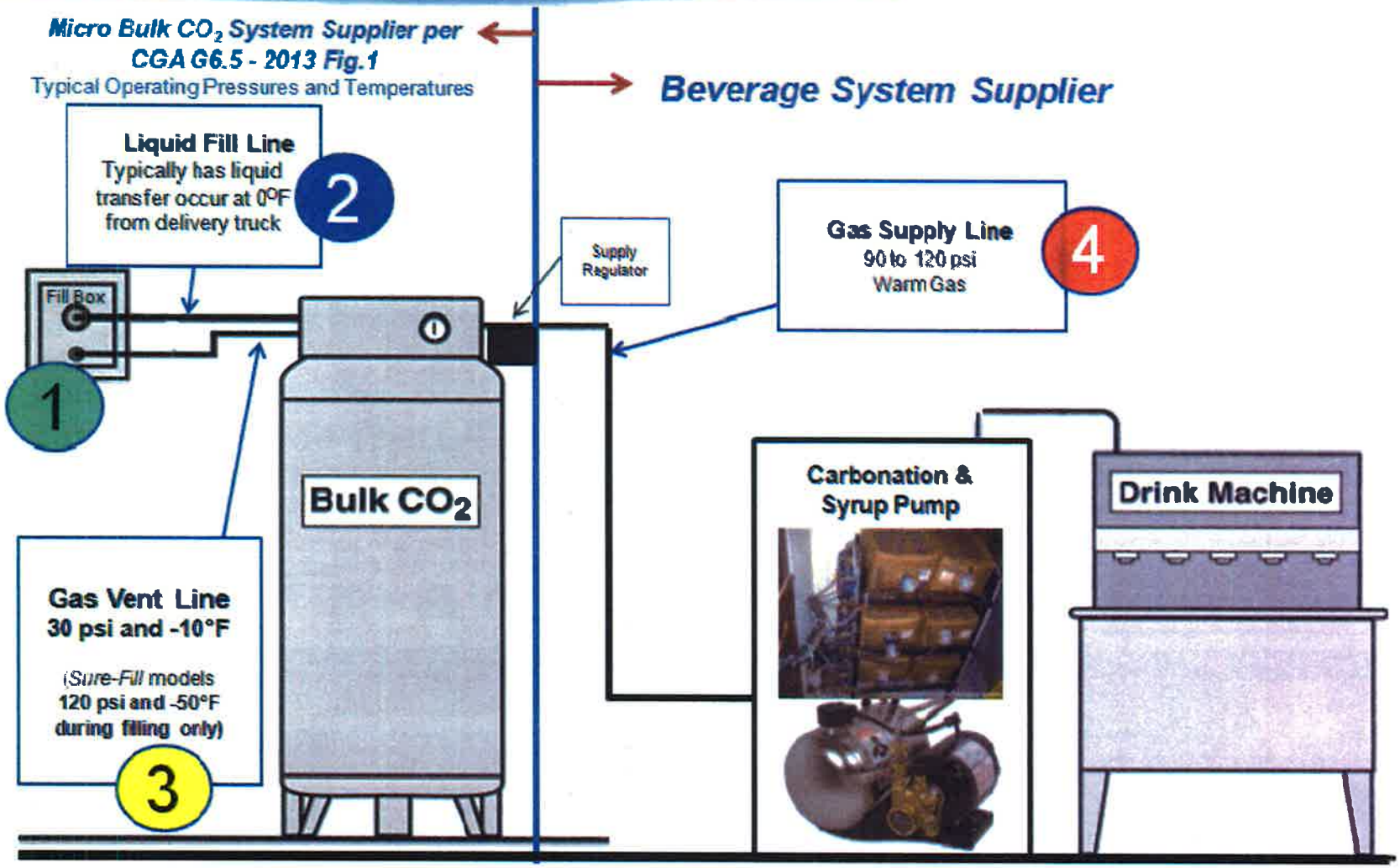


Figure 1—Typical small stationary insulated carbon dioxide supply system for beverage carbonation and dispensing

Beverage Carbonation Soda Systems – Multiple Components

NuCO2®



NuCO2 XACTBEV BEVERAGE CARBONATION SOLUTIONS

Beverage Carbonation Soda Systems – "BIB's"

NuCO2®

Syrup Pumps: normally powered by CO2 and exhaust into room

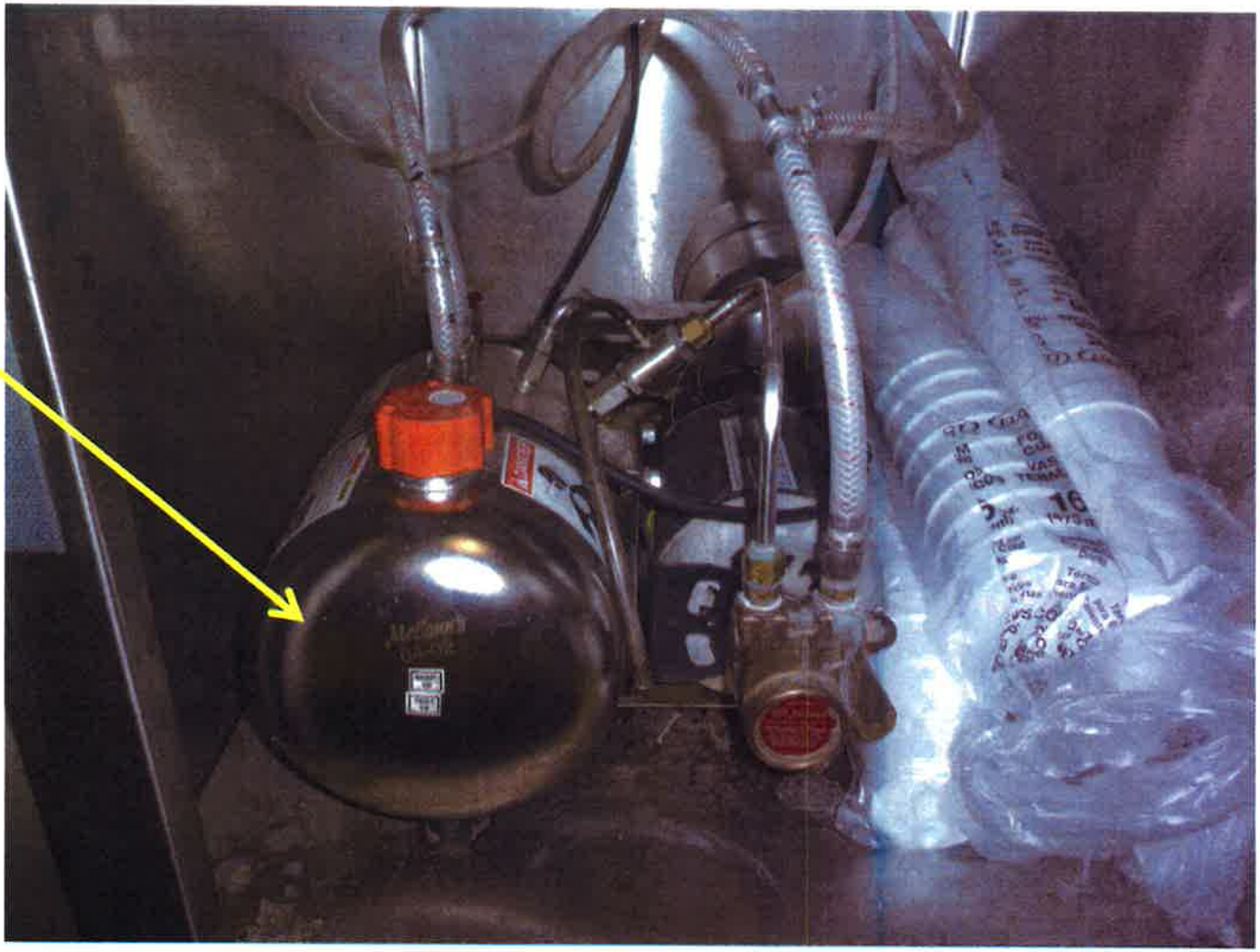
Bag-in-Box Syrup Flavors

NuCO2 XACTBEV 10

Beverage Carbonation Soda Systems – "Carbonators"

NuCO2®

Carbonator: CO_2 and water are mixed under pressure to create carbonated water



NuCO2® XACTBEV® BEVERAGE CARBONATION SOLUTIONS

CO_2 Gas Detection Jurisdictional Authorities: Multiple Requirements Must Be Satisfied

Hazardous Materials Jurisdiction: OSHA and Fire Codes

- OSHA Occupational Safety and Health Administration
- IFC International Fire Code
- NFPA 55 National Fire Protection Association
- Local/Municipal Code Ammendment Mandates

Pressure Vessel Jurisdiction

NBIC **National Board Inspection Code**

Regulatory CO_2 Gas Detection Requirements Affecting the Restaurant Industry in the United States

OSHA and Carbon Dioxide

OSHA PEL/STEL for CO_2 – Permissible Exposure Limit/Short Term Exposure Limit

NuCO2®

CAL/OSHA PELs

5000 ppm (9000 mg/m³) TWA

30000 ppm (54000 mg/m³) STEL

HE4 -- metabolic stress

HE11 -- increased pulmonary ventilation rates

HE17 -- asphyxiation

2016 NFPA 55 and Insulated Carbon Dioxide Systems > 100 lbs

13.10 Carbon Dioxide Beverage Systems.

13.10.1 General. Systems with more than 100 lb (45 kg) of carbon dioxide used in beverage dispensing applications shall comply with 13.10.2 through 13.10.4.

2016 NFPA 55 Section 13.6 – PEL/STEL

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13.6 Small Insulated Liquid Carbon Dioxide Indoor Systems.

13.6.1* Container foundations or floors in multistoried buildings shall be designed to support the weight of the system at its full capacity in accordance with the building code.

13.6.2* Rooms or areas where container systems are filled and used indoors or in enclosed outdoor locations shall be provided with a gas detection and alarm system that shall be capable of detecting and notifying the building occupants of a gas release of carbon dioxide at, or in excess of the Time-Weighted Average–Permissible Exposure Limit (TWA-PEL) published by the Occupational Safety and Health administration (OSHA) and the Threshold Limit Value–Short Term Exposure Limit (TLV-STEL) as published by the American Conference of Governmental Industrial Hygienists (ACGIH). More conservative set points shall be permitted to be used.

2016 NFPA 55 Section 13.10 – "areas where a leak…can collect"

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13.10.4 Required protection. Carbon dioxide storage tanks, cylinders, piping, and equipment located indoors, in rooms, and other areas where a leak of carbon dioxide can collect shall be provided with either ventilation in accordance with 13.10.4.1 an emergency alarm system in accordance with 13.10.4.2. OR (MISSING)

2018 IFC: Health Class 3 Hazard Ranking and Insulated Carbon Dioxide Systems > 100 lbs

2018 IFC *Chapter 50* – Health Class 3 Hazard Ranking: Leak Detection

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5005.1.12 Emergency isolation. Where gases or liquids having a hazard ranking of Health Class 3 or 4, Flammability Class 4 or Instability Class 3 or 4 in accordance with NFPA 704 are carried in pressurized piping above 15 pounds per square inch gauge (psig) (103 kPa), an *approved* means of leak detection and emergency shutoff or excess flow control shall be provided. Where the piping originates from within a hazardous material storage room or area, the excess flow control shall be located within the storage room or area. Where the piping originates from a bulk source, the excess flow control shall be located as close to the bulk source as practical.

Exceptions:

1. Piping for inlet connections designed to prevent backflow.
2. Piping for pressure relief devices.

5005.2 Indoor dispensing and use. Indoor dispensing and use of hazardous materials shall be in buildings complying

2018 INTERNATIONAL FIRE CODE®

NuCO2 XACTBEV 23

2018 IFC *Chapter 53* – Insulated Liquid Carbon Dioxide Systems > 100 lbs

5307.3 Insulated liquid carbon dioxide systems used in beverage dispensing applications. Insulated liquid carbon dioxide systems with more than 100 pounds (45.4 kg) of carbon dioxide used in beverage dispensing applications shall comply with Section 5307.3.1.

2018 IFC Chapter 53 – CO_2 Sensors "where gas is expected to accumulate"

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5307.3.1 Ventilation. Where insulated liquid carbon dioxide storage tanks, cylinders, piping and equipment are located indoors, rooms or areas containing storage tanks, cylinders, piping and equipment, and other areas where a leak of carbon dioxide is expected to accumulate, shall be provided with mechanical ventilation in accordance with Section 5004.3 and designed to maintain the room containing carbon dioxide at a negative pressure in relation to the surrounding area.

Exception: A gas detection system complying with Section 5307.3.2 shall be permitted in lieu of mechanical ventilation.

5307.3.2 Gas detection system. Where ventilation is not provided in accordance with Section 5307.3.1, a gas detection system shall be provided in rooms or indoor areas and in below-grade outdoor locations with insulated carbon dioxide systems. Carbon dioxide sensors shall be provided within 12 inches (305 mm) of the floor in the area where the gas is expected to accumulate or other *approved* locations. The system shall be designed as follows:

2017 NBIC :
Part 1 Supplement 3 and Part 2 Supplement 12

NBIC Gas Detection: PEL/STEL and "where gas detection is monitored…"

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(17) S3.4 GAS DETECTION SYSTEMS

A continuous gas detection system shall be provided in the room or area where container systems are filled and used, in areas where the heavier than air gas can congregate and in below grade outdoor locations. Carbon dioxide (CO_2) sensors shall be provided within 12 inches (305mm) of the floor in the area where the gas is most likely to accumulate or leaks are most likely to occur. The system shall be designed to detect and notify at a low level alarm and high level alarm.

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

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

NBIC User Questions

"...in the room or area where container systems are filled *AND USED, IN AREAS WHERE THE HEAVIER THAN AIR GAS CAN CONGREGATE*..."

1. If the "container system" , meaning the gas the container system provides , is distributed throughout the facility and therefore used, is gas detection required regardless of where the container is installed?

2. If the "container system" , meaning the gas the container system provides, is distributed throughout the facility and therefore used, and multiple potential leak points exist due to gas distribution piping and various equipments utilizing CO2, these areas are subject to "gas congregating" and are therefore required to have gas detection?

NBIC User Questions

"...and in below grade outdoor locations..."

1. If the pressure vessel is installed in an *above grade* enclosed space or confined space location, isn't CO_2 gas detection required? This appears to be an oversight?

NBIC User Questions

" Carbon dioxide (CO2) *sensors shall be provided* within 12 in. (305mm) of the floor *in the area where the gas is most likely to accumulate or leaks most likely to occur*."

1. Areas where the gas is most likely to accumulate or leaks most likely to occur in the distribution piping and CO_2 equipment utilizing the gas. Does this sentence imply whether the storage vessel is installed indoors or outdoors, gas detection is required?

Code Harmonization

NuCO2®

- Harmonizing code when possible eliminates confusion for Inspectors and Users.

- OSHA, Fire Codes and NBIC all have the goal of Safety for everyone.

- Harmonizing both CO_2 concentration alarm threshold levels, and where CO_2 gas detection is required helps everyone better understand the potential hazards and employ safety equipment more effectively.