Date Distributed: January 25, 2019

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD SUBGROUP PRESSURE RELIEF DEVICES

MINUTES

Meeting of January 15, 2019
San Antonio, TX

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The National Board of Boiler & Pressure Vessel Inspectors
1055 Crupper Avenue
Columbus, Ohio 43229-1183
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1. **Call to Order**

The meeting was called to order at 8:00 AM on Tuesday January 15, 2018 by Chair Kim Beise.

Members and Visitors in attendance can be found in the signed attendance sheet (Attachments Pages 1-2)

2. **Announcements**

Mr. Beise announced the reception for Wednesday and meals provided.

Mr. Scribner gave an announcement stating that the NBIC procedures are in the process of being revised to address Sub-committee and Sub-group membership and with the exception of Jurisdictional Members, other nominations will not be considered until the NBIC procedures are revised.

Mr. Beirne and Mr. Scribner gave a presentation on the new action item request system and future balloting system

3. **Adoption of the Agenda**

The agenda dated December 21, 2018 was presented. With the exception of Mr. Vogel other nominations were removed from the agenda. It was moved and seconded to adopt the revised agenda. The motion was unanimously approved.

4. **Approval of Minutes**

It was moved and seconded to approve the July 2018 minutes. The motion was unanimously approved with the exception of one abstention (K.Simmons).

5. **Review of the Roster**

a. Nominations

- Mr. Mike Vogel – SG PRD A motion was made to recommend Mike Vogel's appointment to SG-PRD. After discussion a vote was taken and the motion unanimously passed.

b. Reappointments

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

c. Resignations

- There are no resignations

6. Interpretations

Item Number: 18-90	NBIC Location: Part 4, 2.2.10 h) (Part 1, 2.9.6 h))	See attachments page 3
General Description: Is it acceptable to plug the Valve Casing Drain and provide the required drainage by another drain connection installed at the bottom of the inlet end of the discharge elbow, as long as it is below the level of the valve seat? **Task Group:** None **Meeting Action:** A motion was made and seconded to accept the proposed response. After discussion a vote was taken and unanimously passed.		

7. Action Items

Item Number: NB12-0901	NBIC Location: Part 4	No Attachement
General Description: Prepare a guide for repair of tank vents **Task Group:** B. Donalson (PM), D. DeMichael, K. Simmons, K. Beise, B. Nutter, J. Little, S. Artrip **Meeting Action:** Work on the text continues and will have draft by the next meeting.		

Item Number: NB14-0602B	NBIC Location: Part 2	No Attachment
General Description: Improve index in Part 2 relating to pressure relief devices **Task Group:** D. Marek (PM), B. Donalson, D. DeMichael, B. Hart **Meeting Action:** Proposal will be made following the publication of the 2019 edition.		

Item Number: NB15-0108B	NBIC Location: Part 1	No Attachment
General Description: Address pressure relief devices in new supplement on high temperature hot water boilers **Task Group:** A. Renaldo (PM), D. Marek, D. McHugh, B. Nutter **Meeting Action:** Work continues on this item.		

Item Number: NB15-0305	NBIC Location: Part 4	No Attachment
General Description: Create Guidelines for Installation of Overpressure Protection by System Design. **Task Group:** B. Nutter, A. Renaldo, D. Marek (PM), D. DeMichael **Meeting Action:** Work continues on this item.		

Item Number: NB15-0307	NBIC Location: Part 4	No Attachment

General Description: Create Guidelines for Repair of Pin Devices.

Task Group: D. McHugh (PM), A. Renaldo, T. Tarbay, R. McCaffrey

Meeting Action: Work continues on this item.

Item Number: NB15-0308	NBIC Location: Part 4	See attachments pages 4-9

General Description: - Create Guidelines for Installation of Pressure Relief Devices for Organic Fluid Vaporizers.

Task Group: T. Patel (PM), K. Beise, B. Nutter

Meeting Action: Item was letter balloted and passed unanimously. This item is referred to SC-PRD.

Item Number: NB15-0315	NBIC Location: Part 4, 2.5.6 and 2.6.6 and Part 1, 4.5.6 and 5.3.6	No Attachment

General Description: Review isolation Valve Requirements, and reword to allow installation of pressure relief devices in upstream piping.

Task Group: D. DeMichael (PM), B. Nutter, A. Renaldo, D. Marek

Meeting Action: Work continues on this item.

Item Number: NB15-0321	NBIC Location: Part 4, 3.2.5 a) and Part 2, 2.5.7 a)	No Attachment

General Description: Review testing requirements for in-service testing of pressure relief devices

Task Group: A. Cox, A. Renaldo (PM), D. Marek, S. Irvin, D. DeMichael, B. Nutter, J. Ball

Meeting Action: Item was letter balloted between meetings and received some negative comments which will need to be resolved before item moves forward.

Item Number: NB15-0324	NBIC Location: Part 4	No Attachment

General Description: Create Guidelines for Inspection and Testing Frequencies with respect to shelf life and storage of pressure relief valves.

Task Group: A. Rendaldo (PM), B. Nutter, K. Simmons, D. Marek, J. Little

Meeting Action: A draft showing revisions as a result of negative comments was presented. This will be will be letter balloted between meetings.

Item Number: NB16-0805	NBIC Location: Part 4, 2.6.6 and Part 1, 5.3.6	No Attachment

General Description: Temperature ratings for discharge piping and fittings

Task Group: A. Renaldo (PM), T. Patel, D. Marek

Meeting Action: A new proposal will be letter balloted between meetings addressing negative comments.

Item Number: NB17-0401	NBIC Location: Part 4	See attachments page 10

General Description: Valve drain plug recommendations for shipping.

Task Group: (PM) K. Beise, M. Brodeur, R.McCaffrey

Meeting Action: A motion was made and seconded to accept the proposal. After discussion a vote was taken and the motion passed unanimously.

Item Number: 17-115	NBIC Location: Part 4, Section 2	No Attachment

General Description: Complete rewrite of Section 2 combining common requirements into a general requirements section for all pressure relief devices and look at combining with 2.4.3, 2.4.4.

Task Group: A. Renaldo (PM), D. McHugh, D. Marek

Meeting Action: A draft proposal was presented as a progress report. This item will be letter balloted between meetings.

Item Number: 17-119	NBIC Location: Part 4, 2.2.5 and Part 1, 2.9.1.4	No Attachment

General Description: States pressure setting may exceed 10% range. Clarify by how much.

Task Group: T. Patel (PM), D. Marek

Meeting Action: It was determined that the same language was in ASME Section I. This item is on hold pending completion of ASME action item.

Item Number: 17-128	NBIC Location: Part 4, 2.4.4.3 and Part 1, 3.9.4.3	No Attachment

General Description: allows Y-base to be used while 2.4.1.6 a) prohibits. This appears to be a conflict.

Task Group: B. Nutter (PM), S. Irvin

Meeting Action: It was determined that the same language was in ASME Section IV. This item is on hold pending completion of ASME action item.

Item Number: 17-131	NBIC Location: Part 4, 2.5.7 a) and Part 1, 4.7.3 a)	See attachments Pages 11-12

General Description: Review overpressure protection requirements for hot water storage tanks that exceed 160 psi.

Task Group: J. Ball (PM), B. Hart

Meeting Action: A combined proposal of this item and 17-159 was presented. A motion was made and seconded. After discussion a vote was taken and received two negatives (Nutter, Cox). After further discussion the proposal was revised. A motion was made and seconded to accept the revised proposal. The motion unanimously passed.

Item Number: 17-132	NBIC Location: Part 4, 3.2.6 and Part 2, 2.5.8	No Attachment

General Description: Paragraph 3.2.6 can be put into tabular format.

Task Group: B. Nutter (PM), M. Brodeur, D. Marek, D. DeMichael, A. Cox, P. Dhobi, R. McCaffrey, T. Beirne

Meeting Action: This item will be letter balloted between meetings.

Item Number: 18-73	NBIC Location: Part 4, 2.3 and Part 1, S5.7.6	See attachments pages 13-17
General Description: Update installation requirements for Thermal Fluid Heaters **Task Group:** T. Patel (PM), B. Nutter **Meeting Action:** This item was letter balloted between meetings and unanimously passed. Item is referred to SC-PRD.		

8. New Business

Item Number: 18-80	NBIC Location: NBIC Location: Part 4, S3.1, S4.1, S6.1	No Attachment
General Description: Addition of a "Scope" section to Part 4, S3.1, S4.1, and S6.1 to stay consistent with other sections **Task Group:** T. Patel (PM), A. Renaldo, K. Simmons, P. Dhobi **Meeting Action:** A task group was formed to work on this item.		

9. Presentations

- None

10. Future Meetings

July 16, 2019 Kansas City, MO
January TBD

11. Adjournment

A motion was made, seconded, voted on, and unanimously passed to adjourn the meeting at approximately 3:30 PM.

Respectfully Submitted,

Thomas P. Beirne, P.E.

Secretary, NBIC Subgroup Pressure Relief Devices

pc: D. Douin
B. Weilgozinski
J. Ellis

SG Pressure Relief Devices Attendance Sheet - 11/15/2019

Name	Company	Phone Number	Email	Signature
Kim Beise	Dowco Valve Company	(651) 261-1859	kbeise@dowcovalve.com	
Daniel Marek	Mainthia Technologies	(216) 433-5494	daniel.t.marek@nasa.gov	
Thomas Beirne	National Board	(614) 888-8320	tbeirne@nationalboard.org	
Marianne Brodeur	International Valve & Instrument Corporation	(413) 736-3682	marianne@ivicorp.net	
Alton Cox	JAC Consulting	(704) 301-8532	alton@jaltoncox.com	
Denis DeMichael	Chemours Company	(302) 773-3156	denis.b.demichael@chemours.com	
Robert Donalson	Pentair	(713) 986-9339	bob.donalson@~~pentair.com~~ emerson.com	
Raymond McCaffrey	Quality Valve	(251) 476-1045	raymond@qualityvalve.com	
David McHugh	Allied Valve	(312) 226-1506	mchughd@alliedvalve.com	
Brandon Nutter	Dupont	~~(302) 999-6812~~ 804-383-3570	brandon.k.nutter-1@dupont.com	
Thakor Patel	Farris Engineering	(440) 838-5090	tpatel@curtisswright.com	
Adam Renaldo	Praxair	(716) 879-2928	adam_renaldo ~~adam.renaldo@praxair.com~~	Adam Renaldo
Kevin Simmons	Emerson	(281) 274-4526	kevin.l.simmons@emerson.com	
* Raymond McCaffrey IV	Quality Valve	251-476-1045	Mac@qualityvalves.com	
Bayce Hart	One CIS	610 223 3560	debbryha@PTD.NET	
Del Schirmer	AXA-XL	651-666 9824	del.schirmer@ Boiler Property .com	
Alfred Donaldson	BHGE Consolidated	832-360 7892	alfred.donaldson@ BHGE.com	
Mike Vogel	State of Illinois	217-725 7595	mike.vogel@ illinois.gov	
Scott Artrip	Eastman Chemical	423-963 7046	sartrip@eastman.com	
Charles Wilson	Eastman Chemical	423-440 3158	CDWilson@Eastman.com	
Junior Little	Eastman Chemical	423-963 9701	jlittle@eastman.com	

* Alternate for Raymond McCaffrey

Name	Company	Phone Number	Email	Signature
Tom Tarbay	TRT Consultants	614.353.0027	trtarbay@yahoo.com	Tom Tarbay
JON WOLF	ZURICH	920-253 8781	jon.wolf@zurichNA.com	J Wolf
PRAKASH DHOBI	LAKESIDE Process controls Ltd	226-979-2965	prakash.dhobi@lakesidecontrols.com	PD

Interpretation Item 18-90

Proposed Interpretation

Inquiry:	18-90
Source:	Keith MacLean, P.Eng.
Subject:	Part 1, 2.9.6 h) and Part 4, 2.2.10 h)
Edition:	2017
Question 1:	Is it acceptable to plug the Valve Casing Drain and provide the required drainage by another drain connection installed at the bottom of the inlet end of the discharge elbow, as long as it is below the level of the valve seat?
Reply 1:	Yes – as long as it is below the valve seat and meet or exceeds the size required by the code. Or Yes – as long as it is markedly below the level of the valve seat and also the provided drain connection on the bottom of the inlet of the outlet elbow is at least the next largest pipe size, compared to the code required size - of the not used valve casing drain.
Committee's Question:	Is it acceptable to plug the Valve Casing Drain and provide the required drainage by another drain connection installed at the bottom of the inlet end of the discharge elbow, as long as it is below the level of the valve seat?
Committee's Reply:	No.
Rationale:	Code clearly states the valve casing drain be open.
SC Vote	
NBIC Vote	

Item No # NB15 – 0308 Part 4 12-26-18

Editorial Note: Add following for Installation of pressure relief valves for Organic Fluid Vaporizers in Part 4, Section 2 and renumber existing paragraphs 2.4, 2.5, 2.6 to 2.5, 2.6 and 2.7 respectively.

Proposal:

Part 4

2.4 OVERPRESSURE PROTECTION FOR ORGANIC FLUID VAPORIZERS

2.4.1 GENERAL

Organic Fluid Vaporizers shall be provided with overpressure protection in accordance with the code of Construction. The vaporizer shall be designed in accordance with the rules of the Code of Construction for vaporizer for a working pressure of at least 40 psi (280 kPa) above the operating pressure at which it will be used.

2.4.2 Pressure Relief Devices

2.4.2.1 Organic Fluid Vaporizers shall be equipped with one or more pressure relief devices unless the option for overpressure protection by system design is utilized (when permitted by the original code of construction).

When pressure relief devices are used, the following shall apply:

a) Pressure relief valve(s) shall be of a totally enclosed type.
b) A lifting lever shall not be used in Pressure relief valve(s). A body drain is not required.
c) Pressure relief valves and rupture disks shall be in accordance with the code of construction and designed for liquid, vapor, or combination service as required for the specific installation, service fluids, and overpressure conditions.
d) Cast iron fittings shall not be used.
e) Copper and Copper Alloys shall not be used.
f) The inlet connection to the valve shall be not less than NPS ½ (DN 15).

2.4.3 LOCATION

Pressure relief devices shall be connected to the vaporizers in accordance with the original code of construction.

2.4.4 CAPACITY

The pressure relief device(s) shall have sufficient capacity to prevent the pressure vessel from exceeding the maximum pressure specified in the vessel code of construction.

2.4.5 SET PRESSURE

a) When a single relief device is used, the set pressure marked on the device shall not exceed the maximum allowable working pressure.

b) When more than one pressure relief device is provided to obtain the required capacity, only one pressure relief device set pressure needs to be set at or below the maximum allowable working pressure. The set pressure of the additional relief devices shall be such that the pressure cannot exceed the maximum pressure permitted by the code of construction.

2.4.6 INSTALLATION

a) A rupture disk may be installed between the pressure relief valve and the vaporizer to minimize the loss by leakage of material through the pressure relief valve, provided the following requirements are met:

1. The cross-sectional area of the piping to a vaporizer shall be not less than the required relief area of the rupture disk.

2. The maximum pressure of the range for which the disk is designed to rupture does not exceed the opening pressure for which the pressure relief valve is set or the maximum allowable working pressure of the vessel.

3. The opening provided through the rupture disk, after breakage, is sufficient to permit a flow equal to the capacity of the attached valve, and there is no chance of interference with the proper functioning of the valve, but in no case shall this area be less than the inlet area of the valve.

4. A pressure gage, try cock, free vent, or a suitable telltale indicator should be provided in space between a rupture disk and the pressure relief valve. This arrangement permits the detection of disk rupture or leakage.

5. Every rupture disk shall have a specified bursting pressure at a specified temperature and shall be marked with a lot number.

6. Every rupture disk shall be guaranteed by its manufacturer to burst within 5%(plus or minus) of its specified bursting pressure.

b) A suitable condenser may be used in lieu of piping the vapors to the atmosphere that will condense all the vapors discharged from the pressure relief valve.

c) Pressure relief valves shall be disconnected from the vaporizer at least once yearly for inspection and repair if necessary. ~~They~~ Pressure relief valves shall be tested after repair and then replaced on the vaporizer.

d) The pressure relief valve shall be provided with suitable discharge piping. The cross-sectional area of discharge piping shall not be less than the full area of the valve outlet.

e) The pressure relief discharge should be connected to a closed, vented storage tank or blowdown tank with solid piping (no drip pan elbow, or other air gap).

When outdoor discharge is used, the following should be considered for discharge piping hazards.

At the point of discharge:

1) Both thermal and chemical reactions (personnel hazard)

2) Combustible materials (fire hazard)

3) Surface drains (pollution and fire hazard)

4) Rain cap on the discharge (keep both air and water out of the system)

Along discharge piping:

5) Drip leg near device and anywhere into point (prevent liquid collection)

6) Heat tracing for systems using high freeze point fluids (prevent blockage)

f) Pressure relief valve discharge capacity shall be determined from the following equation:

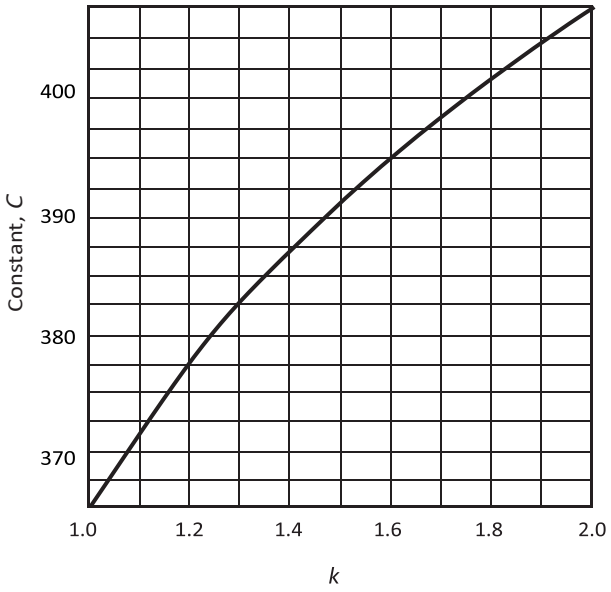
$W = CKAP\sqrt{(M/T)}$

Where
A = Discharge Area of Pressure relief Valve,in² (mm²)
C = Constant for vapor that is a function of Specific Heats k=cp/cv (See Figure x.x.x.d). Note: Where k is not known, k=1.001

K = coefficient of discharge for valve design
M = molecular weight
P = (set pressure+ OP+ atmosphere pressure, psia (Mpa)
T = absolute temperature at inlet, °F + 460 (°C + 273).
W = flow of vapor, lb/hr (kg/hr)
OP = Overpressure required for Pressure Relief Valve to reach capacity specified in code of construction

Figure X.X.X.d

Constant, C, for Vapor Related to Ratio of Specific Heats ($k = c_p/c_v$)



$$W = K\left(CAP\sqrt{M/T}\right)$$

(U.S. Customary Units)

$$C = 520\sqrt{k\left(\frac{2}{k+1}\right)^{\frac{k+1}{k-1}}}$$

(SI Units)

$$C = 39.48\sqrt{k\left(\frac{2}{k+1}\right)^{\frac{k+1}{k-1}}}$$

The required minimum pressure relief valve relieving capacity shall be determined from the following equation:

W = (C X H X 0.75)/h

Where
C = maximum total weight or volume of fuel burned per hour, lb (kg) or ft^3 (m^3).
H = heat of combustion of fuel, Btu/lb (J/kg) or Btu/ft^3 (J/m^3)
h = latent heat of heat transfer fluid at relieving pressure, Btu/lb (J/kg)
W = weight of organic fluid vapor generated lb per hour (kg per hour)

The sum of the pressure relief valve capacities marked on the valves shall be equal to or greater than W.

PROPOSAL:

Part 1 SUPPLEMENT XX, GUIDELINES FOR INSTALLATION OF ORGANIC FLUID VAPORIZERS

SX.7 OVERPRESSURE PROTECTION FOR ORGANIC FLUID VAPORISERS

SX.7.1 GENERAL REQUIREMENTS

Organic Fluid Vaporizers shall be provided with overpressure protection in accordance with the code of Construction. The vaporizer shall be designed in accordance with the rules of the Code of Construction for vaporizer for a working pressure of at least 40 psi (280 kPa) above the operating pressure at which it will be used.

SX.7.2 PRESSURE RELIEF DEVICES

X.7.2.1 Organic Fluid Vaporizers shall be equipped with one or more pressure relief devices unless the option for overpressure protection by system design is utilized (when permitted by the original code of construction).
When pressure relief devices are used, the following shall apply:

a) Pressure relief valve(s) shall be of a totally enclosed type.
b) A lifting lever shall not be used in Pressure relief valve(s). A body drain is not required.
c) Pressure relief valves and rupture disks shall be in accordance with the code of construction and designed for liquid, vapor, or combination service as required for the specific installation, service fluids, and overpressure conditions.
d) Cast iron fittings shall not be used.
e) Copper and Copper Alloys shall not be used.
f) The inlet connection to the valve shall be not less than NPS ½ (DN 15).

SX.7.3 LOCATION

Pressure relief devices shall be connected to the vaporizers in accordance with the original code of construction.

SX.7.4 CAPACITY

The pressure relief device(s) shall have sufficient capacity to prevent the pressure vessel from exceeding the maximum pressure specified in the vessel code of construction.

SX.7.5 SET PRESSURE

a) When a single relief device is used, the set pressure marked on the device shall not exceed the maximum allowable working pressure.

b) When more than one pressure relief device is provided to obtain the required capacity, only one pressure relief device set pressure needs to be set at or below the maximum allowable working pressure. The set pressure of the additional relief devices shall be such that the pressure cannot exceed the maximum pressure permitted by the code of construction.

X.7.6 INSTALLATION

a) A rupture disk may be installed between the pressure relief valve and the vaporizer to minimize the loss by leakage of material through the pressure relief valve, provided the following requirements are met:

1. The cross-sectional area of the piping to a vaporizer shall be not less than the required relief area of the rupture disk.

2. The maximum pressure of the range for which the disk is designed to rupture does not exceed the opening pressure for which the pressure relief valve is set or the maximum allowable working pressure of the vessel.

3. The opening provided through the rupture disk, after breakage, is sufficient to permit a flow equal to the capacity of the attached valve, and there is no chance of interference with the proper functioning of the valve, but in no case shall this area be less than the inlet area of the valve.

4. A pressure gage, try cock, free vent, or a suitable telltale indicator should be provided in space between a rupture disk and the pressure relief valve. This arrangement permits the detection of disk rupture or leakage.

5. Every rupture disk shall have a specified bursting pressure at a specified temperature and shall be marked with a lot number.

6. Every rupture disk shall be guaranteed by its manufacturer to burst within 5%(plus or minus) of its specified bursting pressure.

b) A suitable condenser may be used in lieu of piping the vapors to the atmosphere that will condense all the vapors discharged from the pressure relief valve.

c) Pressure relief valves shall be disconnected from the vaporizer at least once yearly for inspection and repair if necessary. ~~They~~ Pressure relief valves shall be tested after repair and then replaced on the vaporizer.

d) The pressure relief valve shall be provided with suitable discharge piping. The cross-sectional area of discharge piping shall not be less than the full area of the valve outlet.

e) The pressure relief discharge should be connected to a closed, vented storage tank or blowdown tank with solid piping (no drip pan elbow, or other air gap).

When outdoor discharge is used, the following should be considered for discharge piping hazards.

At the point of discharge:

1) Both thermal and chemical reactions (personnel hazard)

2) Combustible materials (fire hazard)

3) Surface drains (pollution and fire hazard)

4) Rain cap on the discharge (keep both air and water out of the system)

Along the discharge piping:

5) Drip leg near device and anywhere into point (prevent liquid collection)

6) Heat tracing for systems using high freeze point fluids (prevent blockage)

NB17-0401 Valve drain plug recommendations for shipping PART 4 Supplement 4

S4.4 PACKAGING, SHIPPING AND TRANSPORTATION OF PRESSURE RELIEF DEVICES

a) The improper packaging, shipment, and transport of pressure relief devices can have detrimental effects on device operation. Pressure relief devices should be treated with the same precautions as instrumentation, with care taken to avoid rough handling or contamination prior to installation.

b) The following practices are recommended:

1) Valves should be securely fastened to pallets in the vertical position to avoid side loads on guiding surfaces except threaded and socket-weld valves up to NPS 2 (DN 50) may be securely packaged and cushioned during transport.

2) Valve inlet and outlet connection, drain connections, and bonnet vents should be protected during shipment and storage to avoid internal contamination of the valve. Shipping caps or plugs should be labeled with a warning that they shall be removed prior to installation. Ensure all shipping covers and/or plugs are removed prior to installation.

January 16, 2019

Item Numbers: 17-131 (Pressure Relief) and 17-159 (Installation) NBIC Location: Part 4, 2.5.7 a) and Part 1, 4.7.3 a)

17-131 General Description: Review overpressure protection requirements for hot water storage tanks that exceed 160 psi.

17-159: General Description: Result of 17-147; review Part 1, 4.7 for references to hot water storage tanks. With the definition of Potable Hot Water Storage Tank items referencing this in Part 1, Section 4.7 need to be updated, modified and or revised.

The following proposal combines the proposals from 17-131 and 17-159.

"Hot water storage tank" is deleted from 4.7.3 a) because is covered in c), and the temperature could exceed 210 deg. F. for those vessels. The item from installation was not changed otherwise. The Part 4, par. 2.5.7 is new but is just Part 1, par. 4.7 slightly rewritten.

Proposal:

NBIC Location: Part 1, 4.7

4.7 REQUIREMENTS FOR HOT WATER STORAGE TANKS/POTABLE HOT WATER STORAGE TANK
4.7.1 SUPPORTS
Each hot water storage tank shall be supported in accordance with NBIC Part 1, 1.6.1.
4.7.2 CLEARANCE AND ACCEPTABILITY
a) The required nameplate (marking or stamping) should be exposed and accessible.
b) The openings when required should be accessible to allow for entry for inspection and maintenance.
c) Each hot water storage tank shall meet the requirements of NBIC Part 1, 4.3.2.
4.7.3 TEMPERATURE AND PRESSURE RELIEF DEVICES
a) Each potable hot water storage tank~~/ hot water storage tank~~ shall be equipped with an ASME/NB certified temperature and pressure relief ~~device~~ valve set at a pressure not to exceed the maximum allowable working pressure and 210°F (99°C).
b) Potable hot water storage tanks exceeding the pressure limit of ASME Code Section IV shall meet the original code of construction and shall be protected by a pressure relief device set not to exceed the vessel's maximum allowable working pressure. A temperature limiting device shall be installed so that the water inside the storage tank does not exceed 210°F (99°C).
c) Each hot water storage tank shall be equipped with an ASME/NB certified pressure relief valve set at a pressure not to exceed the maximum allowable working pressure.
d) The temperature and pressure relief ~~device~~ valve shall meet the requirements of NBIC Part 1, 4.5.

4.7.4 THERMOMETERS

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

4.7.5 SHUT OFF VALVES
a) Each hot water storage/potable hot water storage tank shall be equipped with stop valves in the water inlet piping and the outlet piping in order for the hot water storage tank to be removed from service without having to drain the complete system.
b) Each hot water storage/potable hot water storage tank shall be equipped with a bottom drain valve to provide for flushing and draining of the vessel.

NBIC Location: Part 4, 2.5.7

2.5.7 TEMPERATURE AND PRESSURE RELIEF DEVICES FOR HOT WATER STORAGE TANKS/POTABLE HOT WATER STORAGE TANK

a) Each potable hot water storage tank shall be equipped with an ASME/NB certified temperature and pressure relief ~~device~~ valve set at a pressure not to exceed the maximum allowable working pressure and 210°F. (99°C).
b) Potable hot water storage tanks exceeding the pressure limit of ASME Code Section IV shall meet the original code of construction and shall be protected by a pressure relief device set not to exceed the vessel's maximum allowable working pressure. A temperature limiting device shall be installed so that the water inside the storage tank does not exceed 210°F (99°C).
c) Each hot water storage tank shall be equipped with an ASME/NB certified pressure relief valve set at a pressure not to exceed the maximum allowable working pressure.

~~b~~d) The temperature and pressure relief ~~device~~ valves shall meet the requirements of 2.5.1 through 2.5.6 above.

Item #NB 18-73 Rev 12/26/18

Proposal:

PART 4

2.3 OVER PRESSURE PROTECTION FOR THERMAL FLUID HEATERS

2.3.1 GENERAL

Thermal fluid heaters shall be provided with overpressure protection in accordance with the code of construction.

2.3.2 PRESSURE RELIEF ~~DEVICES~~ VALVES

Thermal fluid heaters shall be equipped with one or more pressure relief ~~devices~~ valves unless the option for overpressure protection by system design is utilized (when permitted by the original code of construction).

When pressure relief ~~devices~~ valves are used, the following shall apply:

a) Pressure relief valve(s) shall be of a totally enclosed type. ~~A body drain is not required~~

~~b) Rupture disks may be installed upstream or downstream of the pressure relief valve(s) in accordance with the original code of construction.~~

b) A lifting lever shall not be used in Pressure relief valve(s). A body drain is not required.

c) Pressure relief valves ~~and rupture disks~~ shall be in accordance with the code of construction and designed for liquid, vapor, or combination service as required for the specific installation, service fluids, and overpressure conditions.

d) Cast iron fittings shall not be used.

e) Copper and Copper Alloys shall not be used.

f) The inlet connection to the valve shall be not less than NPS ½ (DN 15).

2.3.3 LOCATION

a) Pressure relief ~~devices~~ valves shall be connected to the heater in accordance with the original code of construction.

2.3.4 CAPACITY

a) The pressure relief ~~device(s)~~ valves shall have sufficient capacity to prevent the pressure vessel from exceeding the maximum pressure specified in the vessel code of construction.

2.3.5 SET PRESSURE

a) When a single relief ~~device~~ valve is used, the set pressure marked on the ~~device~~ valve shall not exceed the maximum allowable working pressure.

b) When more than one pressure relief ~~device~~ valve is provided to obtain the required capacity, only one pressure relief ~~device~~ valve set pressure needs to be set at or below the maximum allowable working pressure. The set pressure of the additional relief ~~devices~~ valves shall be such that the pressure cannot exceed the maximum pressure permitted by the code of construction.

2.3.6 INSTALLATION

Pressure relief valves and the associated discharge piping shall be installed in accordance with the heater Manufacturer's recommendations. The installation of the pressure relief valves required for Thermal Fluid Heaters shall include but not be limited to following requirements.

a) The pressure relief valve shall be provided with discharge piping. ~~When a discharge pipe is used,~~ The cross-sectional area of discharge piping shall not be less than the full area of the valve outlet. The size of the discharge lines shall be such that any pressure that may exist or develop will not reduce the relieving capacity or adversely affect the operation of the attached pressure vessel relief ~~devices~~ valves. Discharge piping shall be as short and straight as possible and arranged to avoid undue stress on the pressure

relief ~~device~~ valve.

b) The pressure relief valve or valves shall be connected to the pressure vessel independent of any other connection, and shall be attached as close as possible without any unnecessary intervening pipe or fitting.

c) The cross sectional area of the piping between the heater and the relief ~~device~~ valve shall be sized either to avoid restricting the flow to the pressure relief ~~devices~~ valves or made at least equal to the inlet area of the pressure relief ~~devices~~ valves connected to it.

d) When two or more required pressure relief ~~devices~~ valves are placed on one connection, the inlet cross-sectional area of this connection shall be sized either to avoid restricting the flow to the pressure relief ~~devices~~ valves or made at least equal to the combined inlet areas of the pressure relief ~~devices~~ valves connected to it.

e) Unless permitted by the code of construction, there shall be no intervening stop valve between the vessel and its pressure relief ~~device(s)~~ valves, or between the pressure relief ~~device~~ valve and the point of discharge.

f) Pressure relief ~~device~~ valve discharges shall be arranged such that they are not a hazard to personnel or other equipment and, when necessary, lead to a safe location, such as a catchment tank, for the disposal of fluids being relieved.

g) The pressure relief discharge should be connected to a closed, vented storage tank or blowdown tank with solid piping (no drip pan elbow, or other air gap).

When outdoor discharge is used, the following should be considered for discharge piping hazards.

At the point of discharge:

1) Both thermal and chemical reactions (personnel hazard)

2) Combustible materials (fire hazard)

3) Surface drains (pollution and fire hazard)

4) ~~Loop seal or~~ Rain cap on the discharge (keep both air and water out of the system)

Along the discharge piping:

5) Drip leg near device and anywhere into ~~loop~~ point (prevent liquid collection)

6) Heat tracing for systems using high freeze point fluids (prevent blockage)

h) Discharge lines from pressure relief ~~devices~~ valves shall be designed to facilitate drainage or be fitted with low point or valve body drains to prevent liquid from collecting in the discharge side of a pressure relief ~~device~~ valve. Drain piping shall discharge to a safe location for the disposal of the fluids being relieved. The possibility of solidification of fluid leakage into the discharge piping system shall be considered.

~~h) A suitable condenser that will condense all the vapors discharged from the pressure relief valve may be used in lieu of piping the vapors to the atmosphere.~~

~~i) In order to minimize the loss by leakage of material through the pressure relief valve, a rupture disk may be installed between the pressure relief valve and the vaporizer, provided the following requirements are met:~~

~~1). The cross-sectional area of the connection to a vaporizer shall be not less than the required relief area of the rupture disk.~~

~~2) The maximum pressure of the range for which the disk is designed to rupture shall not exceed the opening pressure for which the pressure relief valve is set or the maximum allowable working pressure of the vessel.~~

~~3) The opening provided through the rupture disk, after breakage, shall be sufficient to permit a flow equal to the capacity of the attached valve, and there is no chance of interference with the proper functioning of the valve, but in no case shall this area be less than the inlet area of the valve.~~

~~4) The space between a rupture disk and the valve shall be provided with a pressure gage, try cock, free vent, or a suitable telltale indicator. This arrangement permits the detection of disk rupture or leakage.~~

i) Pressure relief valve discharge capacity for liquid service shall be determined from the following equation:

For Liquid
U.S. Customary Units
$W = 2{,}407KA\sqrt{(P - Pd)w}$

SI Units
$W = $ ~~5092~~ $5.092\ KA\sqrt{(P - Pd)w}$

Where.
W = Liquid Capacity in lb/hr (kg/hr).
A = Discharge Area of Pressure relief Valve, in^2 (mm^2)
K = coefficient of discharge for valve design
P = (Set pressure + OP + Atmosphere pressure, psia (Mpa)
OP = Overpressure required for Pressure Relief
Valve to reach capacity specified in
code of construction
Pd = Pressure at discharge of valve, psia (Mpa)
w = Specific ~~liquid~~ weight of liquid at inlet condition
lb/ft^3 (kg/m^3)

To convert lb/hr of water to gal/min, multiply the capacity in lb/hr by 1/500.

!!!!!!! (SEE PART 1 PROPOSAL ON NEXT PAGE) !!!!!!!

PROPOSAL:

Part 1 SUPPLEMENT 5

S5.7.6 INSTALLATION

Pressure relief valves and the associated discharge piping shall be installed in accordance with the heater Manufacturer's recommendations. The installation of the pressure relief valves required for Thermal Fluid Heaters shall include but not be limited to following requirements.

a) The pressure relief valve shall be provided with discharge piping. ~~When a discharge pipe is used,~~ The cross-sectional area of discharge piping shall not be less than the full area of the valve outlet. The size of the discharge lines shall be such that any pressure that may exist or develop will not reduce the relieving capacity or adversely affect the operation of the attached pressure vessel relief ~~devices~~ valves. Discharge piping shall be as short and straight as possible and arranged to avoid undue stress on the pressure relief ~~device~~ valve.

b) The pressure relief valve or valves shall be connected to the pressure vessel independent of any other connection, and shall be attached as close as possible without any unnecessary intervening pipe or fitting.

c) The cross sectional area of the piping between the heater and the relief ~~device~~ valve shall be sized either to avoid restricting the flow to the pressure relief ~~devices~~ valves or made at least equal to the inlet area of the pressure relief ~~devices~~ valves connected to it.

d) When two or more required pressure relief ~~devices~~ valves are placed on one connection, the inlet cross-sectional area of this connection shall be sized either to avoid restricting the flow to the pressure relief ~~devices~~ valves or made at least equal to the combined inlet areas of the pressure relief ~~devices~~ valves connected to it.

e) Unless permitted by the code of construction, there shall be no intervening stop valve between the vessel and its pressure relief ~~device(s)~~ valves, or between the pressure relief ~~device~~ valve and the point of discharge.

f) Pressure relief ~~device~~ valve discharges shall be arranged such that they are not a hazard to personnel or other equipment and, when necessary, lead to a safe location, such as a catchment tank, for the disposal of fluids being relieved.

g) The pressure relief valve discharge should be connected to a closed, vented storage tank or blowdown tank with solid piping (no drip pan elbow, or other air gap).

When outdoor discharge is used, the following should be considered for discharge piping hazards.

At the point of discharge:

1) Both thermal and chemical reactions (personnel hazard).

2) Combustible materials (fire hazard)

3) Surface drains (pollution and fire hazard)

4) Rain cap on the discharge (keep both air and water out of the system)

Along discharge piping:

5) Drip leg near device and anywhere into point (prevent liquid collection)

6) Heat tracing for systems using high freeze point fluids (prevent blockage)

h) Discharge lines from pressure relief ~~devices~~ valves shall be designed to facilitate drainage or be fitted with low point or valve body drains to prevent liquid from collecting in the discharge side of a pressure relief ~~device~~ valve. Drain piping shall discharge to a safe location for the disposal of the fluids being relieved. The possibility of solidification of fluid leakage into the discharge piping system shall be considered.