Date Distributed: Jan 6, 2022

THE NATIONAL BOARD
OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD INSPECTION CODE COMMITTEE

MAIN SESSION AGENDA

Meeting of January 20th, 2022
San Diego, CA

The National Board of Boiler & Pressure Vessel Inspectors
1055 Crupper Avenue
Columbus, Ohio 43229-1183
Phone: (614)888-8320
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1. **Call to Order**
   8:30AM Pacific Time. For those attending in person, the meeting will be held in Versailles Ballroom on the second floor of the hotel.

2. **Introduction of Members and Visitors**

3. **Check for a Quorum**

4. **Awards/Special Recognition**

5. **Announcements**

   - This will be Ms. Jeanne Bock's last meeting as secretary for Subgroup and Subcommittee Installation, as she has accepted a new position at the National Board. Ms. Michelle Vance will be taking over as secretary for both committees.

   - The National Board will be hosting breakfast and lunch on Thursday. Breakfast will be served from 7:00am to 8:00am, and lunch will be served from 11:30am to 12:30pm. Both meals will be served at the hotel in Le Fontainebleau.

   - A coffee station will be provided outside of the meeting rooms on each floor.

6. **Adoption of the Agenda**

7. **Approval of the Minutes of the July 15th, 2021 Meeting**

   The minutes are available for review online at https://www.nationalboard.org/Index.aspx?pageID=13&ID=18.

8. **Items Approved for 2023 NBIC**

   See Attachment Page 2 for a list of items approved for the 2023 NBIC.

9. Report of Subcommittees

a. Subcommittee Repairs & Alterations

i. Errata

NBIC Location of Error: Part 3, Table 2.3	Attachment Page 3
General Description: Inadvertent omission of two SWPSs in 2021 NBIC Part 3, Table 2.3 **Task Group:** T. Hellman **Explanation of Need:** During the publication process, the SWPSs B2.1-1-207 and B2.1-1/8-228 were deleted from the table. Both SWPSs should still be in Table 2.3 as none of the approved Table 2.3 action items for the 2021 NBIC removed these SWPSs. **January 2022 Meeting Action:**	

ii. Interpretations

Item Number: 20-78	NBIC Location: Part 3, 3.3.3 s) & 3.4.4 d)	No Attachment
General Description: Repairs and Alterations of Tube Bundles **Subgroup:** Repairs and Alterations **Task Group:** P. Shanks (PM). **Explanation of Need:** Submission is for R Certificate Holders we provide Repair Inspection services for. NBIC Part 3, 3.3.3 s) seems to allow to be a repair, but under 3.4.4 d) where the dimensions change it might be classified as an alteration.) **July 2021 Meeting Action:** Mr. Troutt presented a progress report for this item.		

Item Number: 21-32	NBIC Location: Part 3, 4.2	No Attachment
General Description: NDE requirements when repairing defects in original weld metal **Subgroup:** Repairs and Alterations **Task Group:** R. Troutt (PM), M. Toth **Explanation of Need:** This provision will help clarify to "R" Stamp Certificate holders and owners of pressure vessels that are in need of minor repairs to existing welds. Due to the ambiguous wording of this clause any welding on a head to shell joint may be interpreted to require volumetric inspection when the name plate is stamped RT4. **July 2021 Meeting Action:** Mr. Troutt presented a progress report for this item.		

iii. New Interpretation Requests:

iv. Item Number: 21-39 **NBIC Location: Part 3, 3.3.2 e)** **Attachment Page 4**

General Description: Routine repair scope

Subgroup: Repairs and Alterations

Task Group: P. Shanks (PM)

Explanation of Need:
Some R-certificate holders and AIAs are making huge (100 square feet) weld metal buildup type routine repairs on the basis that the components being built up are only 5" tubes and 3.3.2 e) 1) says welded repairs to 5" tubes are routine. As 3.3.2 e) includes "shall be limited to" shouldn't exceeding any one of the listed limitations preclude the routine repair approach.

January 2022 Meeting Action:

Item Number: 21-57 **NBIC Location: Part 3, 3.3.2 a)** **Attachment Page 5**

General Description: Routine Repairs of Section VIII Div 1 built to Appdx 46

Subgroup: Repairs and Alterations

Task Group: T. Seime (PM)

Explanation of Need:
Routine Repairs are not allowed for ASME Sect. VIII Div. 2 or 3 vessels. Routine Repairs should not be allowed for Div. 1 vessels built using the design considerations of Division 2 to establish the thickness and other design details of a component for a Section VIII, Division 1 pressure vessel.

January 2022 Meeting Action:

Item Number: 21-60 **NBIC Location: Part 3, 3.4.5.1 b)** **Attachment Page 6**

General Description: UDS requirements for repairs and alterations for Divisions 2 & 3

Subgroup: Repairs and Alterations

Task Group: G. Galanes (PM)

Explanation of Need:
Is it the intent of interpretation 19-14 to prohibit the R-Certificate holder from recreating a UDS while still allowing the user to create the UDS? If yes, could the R-Certificate holder serve as the user's designated agent to recreate the UDS? Although this interpretation applies specifically to alterations, would this interpretation also be applicable to performing repairs (see 3.3.5.2(a))?

January 2022 Meeting Action:

Item Number: 21-64 **NBIC Location: Part 3, 1.3.1** **Attachment Page 7**

General Description: Repair or Alteration activity allowed prior to Certification

Subgroup: Repairs and Alterations

Task Group: M. Toth (PM)

Explanation of Need:
Applicants for the "R" Certificate are unclear if the NBIC allows for any activities to be performed prior to certification, especially since ASME does allow it.

January 2022 Meeting Action:

Item Number: 21-74 **NBIC Location: Part 3, 1.3.1** **Attachment Page 8**

General Description: ASME Sect VIII, Div 1 Design Personnel Requirements and NBIC Repairs/Alts

Subgroup: Repairs and Alterations

Task Group: T. McBee (PM)

Explanation of Need:
Many have asked what, if any, impact the new ASME VIII-1 Appendix 47 design personnel requirements will have on NBIC repairs and alterations.

January 2022 Meeting Action:

Item Number: 21-75 **NBIC Location: Part 3, 3.3.2 e) 1)** **Attachment Page 9**

General Description: Routine Repairs

Subgroup: Repairs and Alterations

Task Group: None assigned

Explanation of Need:
The wording "but does not include nozzles to pressure-retaining items" could lead into interpreting the nozzle as a whole including the joint attaching the nozzle to the PRI.

January 2022 Meeting Action:

Item Number: 21-79	NBIC Location: Part 3, 3.3.3 h)	Attachment Page 10

General Description: Mechanical Replacement of Shell or Head

Subgroup: Repairs and Alterations

Task Group: None assigned

Explanation of Need:
This interpretation and corresponding Code revision would provide clarity to NBIC users and address whether mechanical replacement of these components is considered a repair.

January 2022 Meeting Action:

Item Number: 21-81	NBIC Location: Part 3, 3.3.6	Attachment Page 11

General Description: Repairs/Alterations of Impact Tested Vessels (Intent Interp)

Subgroup: Repairs and Alterations

Task Group: None assigned

Explanation of Need:
There is an urgent need to address these concerns as the repair firms cannot comply with the existing wording in 3.3.6. The purpose of this Intent Interpretation is to take the approved revisions to the 2023 NBIC Part 3 and provide immediate guidance to users involved in the repair and alteration activities of impact tested vessels.

January 2022 Meeting Action:

v. Action Items – Old Business

Item Number: NB15-2208	NBIC Location: Part 3	No Attachment

General Description: Develop supplement for repairs and alterations based on international construction standards

Subgroup: Graphite

Task Group: Greg Becherer (PM)

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 17-167	NBIC Location: Part 3, S3.2 d)	No Attachment

General Description: Clarify repair inspection requirements for machined only graphite parts.

Subgroup: Graphite

Task Group: Aaron Viet (PM)

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 18-94	NBIC Location: Part 3, S3.2 f), h); S3.4 a), b), c) etc.	No Attachment

General Description: G-mark Requirements for Various Repairs/Alteration to Graphite

Subgroup: Graphite

Task Group: C. Cary (PM)

July 2021 Meeting Action: Progress report.

Item Number: 19-60	NBIC Location: Part 3, 1.5.1	Attachment Page 12

General Description: Quality System For Qualification For The National Board "R" Certificate

Subgroup: Repairs and Alterations

Task Group: R. Miletti (PM), K. Moore, B. Boseo, M. Toth

Explanation of Need: Part 3, 1.5.1 provides a good outline for a Quality Systems Manual. However, the remaining elements of a Quality System, outside of the one's currently being addressed in Item 19-47 and 19-4 need to be embellished to provide a more auditable description of each element.

July 2021 Meeting Action: Mr. Troutt introduced the item, and the proposal was presented by Ms. Kathy Moore. A motion was made and seconded to approve the proposal as presented. After discussion, this motion was rescinded, and instead the proposal will be sent out as a letter ballot to Main Committee.

Item Number: 19-61	NBIC Location: Part 3, 3.3.4	No Attachment

General Description: Quality System For Qualification For The National Board "R" Certificate

Subgroup: Repairs and Alterations

Task Group: P. Shanks (PM), J. Walker, T. McBee

Explanation of Need: Threaded insert are being used to fix a bolt that has broken off on certain types of boilers (autoclaves) which hold the heating elements in the water side of the boiler. When this happens, the technician correcting the problem will simply drill out the broken bolt with an over sized bit and inset a metallic insert. NBIC does address this this type of alteration.

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 19-73	NBIC Location: Part 3, S3	No Attachment

General Description: Requirements for who can make hole plugging repairs on graphite blocks

Subgroup: Graphite

Task Group: C. Cary (PM), A. Viet, A. Stupica

Explanation of Need: Performing hole plugging repairs in graphite blocks is a common repair for graphite pressure vessels, but the NBIC currently has no formal requirements for this type of repair.

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 19-74	NBIC Location: Part 3, S3.3	No Attachment

General Description: Routine repair requirements for partial nozzle replacement

Subgroup: Graphite

Task Group: A. Stupica (PM), M. Bost

Explanation of Need: Currently only nozzle replacement is addressed as a routine repair. The group is planning on defining the types of partial nozzle replacements and repairs that could be defined as routine.

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 19-79	NBIC Location: Part 3, S3.5.4 h)	No Attachment

General Description: Re-word Part 3, S3.5.4 h) to clarify cementing procedure for plugs

Subgroup: Graphite

Task Group: A. Stupica (PM)

Explanation of Need: Existing language includes unnecessary steps and is clunky to read. Text will be reworded to clarify the full procedure.

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 20-25	NBIC Location: Part 3, S2.13	No Attachment

General Description: Repair Procedure for Fire Boxes

Subgroup: SG Historical

Task Group: M. Wahl (PM), Robin Forbes, T. Dillon, L. Moedinger, & F. Johnson

Explanation of Need: In NBIC Part 3, S2.13.10.3, S2.13.11 do not define what to do at a riveted joint. On the tubesheet, or firedoor sheet, where it is flanged to rivet to the firebox, the repairs are silent on what to do at the riveted joint.

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 20-48	NBIC Location: Part 3, 1.6	No Attachment

General Description: Compare 2015 NQA-1 revision to NR program (1.6) for consistency.

Subgroup: Repairs and Alterations

Task Group: B. Wielgoszinski (PM).

Explanation of Need: Latest NQA-1 revision to be compared to NR program (1.6) for consistency.

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 20-52	NBIC Location: Part 3, 1.6.2 a) 2)	No Attachment

General Description: Rvw NR requirements for ASME Section XI Div. 2 potential applications

Subgroup: Repairs and Alterations

Task Group: T. Roberts (PM)

Explanation of Need: This was created based on discussion from Item 20-47 dealing with ANIA requirements.

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 20-53	NBIC Location: Part 3, 3.3.5.2 a) & 3.4.5.1 b)	No Attachment

General Description: Certification of Repair or Alteration Plans

Subgroup: Repairs and Alterations

Task Group: S. Chestnut (PM), B. Schaefer

Explanation of Need: The Clarification of the Certifying Engineer requirements.

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 20-60	NBIC Location: Part 3, 3.3.4.8	No Attachment

General Description: Part 3 Supplement for FFS Guidelines

Subgroup: Repairs and Alterations

Task Group: J. Siefert (PM)

Explanation of Need: The NBIC provides little guidance related to FFS activities and repairs in part 3.

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 20-67	NBIC Location: Part 3, S6	No Attachment

General Description: Revisions to Part 3, Supplement 6

Subgroup: Repairs and Alterations
Task Group: R. Underwood (PM)

Explanation of Need: Supplement 6 was implemented into the 2007 Edition of the NBIC Part 3 to provide requirements and guidelines for repairs, alterations and modifications to DOT Transport Tanks using the National Board's "TR" Program (which was never implemented). S6 has been revised over the years to remove reference to the "TR" Program, but still contains many requirements that are not correct. This purpose of this proposal is to review the entire Supplement and make appropriate revisions that comply with NBIC Part 3 and DOT requirements.

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 20-73	NBIC Location: Part 3, 4.4.2 a) 2)	No Attachment

General Description: Pressure Testing of Connecting Welds (Part 3, 4.4.2(a)(2)

Subgroup: Repairs and Alterations
Task Group: R. Underwood (PM)

Explanation of Need: To clarify what the term "replacement part" as used in 4.4.2(a)(2) of Part 3 means.

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 20-83	NBIC Location: Part 3, 1.5.1 s) & 9.1	Attachment Page 19

General Description: Revision to Part 3, 3.2.2 e)

Subgroup: Repairs and Alterations
Task Group: T. Hellman (PM)

Explanation of Need: Action Item 19-60 is proposing revisions/additions to all of 1.5.1. This proposal is to move the definition of "Nonconformance" out of the current 1.5.1 s) paragraph and into the glossary.

July 2021 Meeting Action: Mr. Troutt presented the proposal and said that this proposal will be sent to all subcommittees for input.

Item Number: 21-02	NBIC Location: Part 3, 1.6	No Attachment

General Description: Define "Fuel Loading" as it pertains to NR activities

Subgroup: Repairs and Alterations

Task Group: P. Edwards (PM)

Explanation of Need: The NR TG would like to clarify "Fuel Loading" as used to determine Category 1, 2 or 3 NR activities.

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 21-06	NBIC Location: Part 3, 4.4.2	No Attachment

General Description: Concessions with pressure testing associated with replacement parts

Subgroup: Repairs and Alterations

Task Group: D. Kinney (PM), R. Miletti, P. Becker, P. Davis, R. Underwood, M. Winters

Explanation of Need: When replacement parts are manufactured and not tested as required by the original code of construction, there needs to be concessions or considerations associated with the pressure testing requirements as to not detrimentally effect the existing pressure retaining item.

Meeting Action: Progress Report.

Item Number: 21-07	NBIC Location: Part 3, 1.3.2 a)	Attachment Page 20

General Description: NBIC Report Form certification clarification.

Subgroup: Repairs and Alterations

Task Group: D. Kinney (PM)

Explanation of Need: The intent is to clarify which Inspector must certify R forms, specifically when there are different AIA's signing the certifications on the R-2 Form.

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 21-09	NBIC Location: Part 3, S2	No Attachment

General Description: Incorporate new repair methods for through and diagonal stays

Subgroup: Historical

Task Group: D. Rose (PM), R. Bryce, R. Forbes, & C. Jowett

Explanation of Need: The code is silent on the inspection of through stays and diagonal stays. Additionally new repair methods are available from ASME that can be incorporated.

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 21-10	NBIC Location: Part 3, 5.2 &5.4	Attachment Page 21

General Description: Add a time frame for R forms (for completion of and submittal of forms)

Subgroup: Repairs and Alterations

Task Group: D. Kinney (PM), B. Schaefer, B. McGuire

Explanation of Need: Currently, the NBIC is silent on how much time may go by after work is completed before the applicable R Form is accepted by the inspector after work is completed. The NBIC is also silent on how much time may go by before the applicable R Form is submitted to the NB and Jurisdictions (as applicable).

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 21-12	NBIC Location: Part 3, 3.3.3, 3.4.4, Section 9	No Attachment

General Description: Clarify the definitions and examples of "Repair" and "Alteration"

Subgroup: Repairs and Alterations

Task Group: P. Becker (PM), K. Moore, P. Shanks, R. Underwood, M. Chestnut, T. Sieme

Explanation of Need: Clarify the definitions of "Repair" and "Alteration" in the Glossary and revise the list of examples of each to better define the allowable scope of activities.

History: This Item was created as a result of conversation regarding Interp. Item 20-78 and Action Item 20-54

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 21-14	NBIC Location: Part 3, 3.4.3	No Attachment

General Description: ASME PCC-2 article references are incorrectly formatted

Subgroup: Repairs and Alterations

Task Group: P. Shanks (PM)

Explanation of Need: The 2018 edition of ASME PCC-2 has a different article numbering system than that used in the 2019 NBIC.

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 21-15	NBIC Location: Part 3, Section 5	No Attachment

General Description: Corrections and revisions to "R" Forms.

Subgroup: Repairs and Alterations

Task Group: D. Kinney (PM)

Explanation of Need: NBIC Part 3 is silent on controls for corrections or revisions to "R" Forms. The NBIC requires quality systems to provide revision controls, and I believe the NBIC should be clear on this as well.

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 21-27	NBIC Location: Part 3, 4.2 a)	Attachment Page 23

General Description: Provision of Exemption for original COC NDE requirements

Subgroup: Repairs and Alterations

Task Group: W. Sperko (PM)

Explanation of Need: Repair organizations that perform shop refurbishment and repair of LPG storage tanks (ASME Section VIII Div 1) encounter repetitive, typical defects that require repair. Many of the typical defects requiring repair meet the definition and could be considered Routine Repair. This being the case one of the frequently observed issues requiring weld repair is defects in original manufacturing butt welds at the head to shell joint with defects that include cold lap, and pinholes. The typical repair involves the excavation of the defect and confirmation of removal via PT. Then the excavation is welded with a typical repair length being less than 6" long. While the CoC in many cases in LPG storage tanks requires a spot RT of the head to shell join, performing RT on the minimal amount of welding typically performed on isolated defects serves no practical purpose in enhancing safety especially when the length of deposited weld metal would be less that the length of the length of the radiographic film used capture the image.

July 2021 Meeting Action: Mr. Troutt introduced the proposal and Mr. Shanks presented the proposed changes. Discussion was held on the changes being proposed. Mr. Sekely asked if this change is necessary dude to the wording of the last sentence in 4.2 a). Mr. Wielgoszinski mentioned that while something may be practicable, it may not be practical. Mr. Moedinger mentioned that an additional requirement regarding 100% volumetric examination during original construction would not impact the inquirer and would not apply often. Mr. Valdez mentioned that this new language will be applied in the field outside of the case that led to the inquirer submitting this request. Mr. Toth commented that he feels the inclusion of the 100% requirement is not needed. Mr. Paul Davis voiced his support for the current language shown in the proposal. Mr. Wielgoszinski asked the Jurisdictional Authorities present at the meeting to provide their thoughts. Some were in favor while others were not in favor. Ultimately it was decided to send the proposal to letter ballot.

Item Number: 21-31	NBIC Location: NBIC Glossary	No Attachment

General Description: Revise definition of "Field"

Subgroup: Repairs and Alterations

Task Group: R. Miletti (PM), P. Gilston, M. Toth, J. Walker

Explanation of Need: A "Field" site under the current definition could be multiple rented or leased spaces used for repairs/alterations, where there is no single or specific customer or job, but rather the locations(s) are used for conducting repair/alteration activities by personnel employed by the Certificate Holder on a continual basis.

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

Item Number: 21-33	NBIC Location: Part 3, 1.2 f)	Attachment Page 24

General Description: Use of code cases pertaining to repairs and alterations

Subgroup: Repairs and Alterations

Task Group: R. Underwood (PM)

Explanation of Need: The NBIC Part 3 already references code cases in various paragraphs such as NR quality requirements, welding method 7, and R Form instructions, but there is no direct reference to acceptance of their use. I think it's always been an unwritten rule that they are permitted to be used with acceptance of the Inspector and Jurisdiction. This proposal will address this in a new paragraph 1.2(f).

July 2021 Meeting Action: Mr. Troutt presented a progress report for this item.

vi. New Items:

Item Number: 21-37	NBIC Location: Part 3, 1.6	No Attachment

General Description: Parts used in NR Activities

Subgroup: Repairs and Alterations

Task Group: B. Wielgoszinski (PM)

Explanation of Need: Clarification that parts used in NR activities are fabricated by NR Certificate Holders and inspected by appropriately endorsed National Board commissioned Inspectors.

January 2022 Meeting Action:

Item Number: 21-43	NBIC Location: Part 3, Glossary	Attachment 26

General Description: Defining and revising "Practicable" and "Practical" within the NBIC

Subgroup: Repairs and Alterations

Task Group: M. Toth (PM)

Explanation of Need: Defining and revising Practicable and Practical within the NBIC and revising where applicable

January 2022 Meeting Action:

Item Number: 21-44 **NBIC Location: Part 3, Glossary** **Attachment 27**

General Description: Defining "De-Rating" within Part 3

Subgroup: Repairs and Alterations

Task Group: M. Toth (PM)

Explanation of Need: Defining de-rating within Part 3

January 2022 Meeting Action:

Item Number: 21-45 **NBIC Location: Part 3, Supplements** **Attachment 28**

General Description: Add a supplement to address oil, gas and chemical repair & alteration scope

Subgroup: Repairs and Alterations

Task Group: R. Underwood (PM)

Explanation of Need: There has been interest from companies operating with the Oil, Gas and Chemical industries to address certain types of repairs that may exist in ASME PCC-2 or API. NBIC does not have many of these repair methods within the book.

January 2022 Meeting Action:

Item Number: 21-53 **NBIC Location: Part 3, S8.5 a)** **Attachment 30**

General Description: Post Repair Inspection of weld repairs to CSEF steels

Subgroup: Repairs and Alterations

Task Group: P. Gilston (PM)

Explanation of Need: The requirement for Inspector involvement in post-repair inspections to CSEF weld repairs is to ensure future safe operation of the boiler. This is a function of the inservice Authorized Inspection Agency, not the Repair Inspector, whose duties end with completion of repair documentation.

January 2022 Meeting Action:

Item Number: 21-67 **NBIC Location: Part 3, 3.4.9** **Attachment 31**

General Description: Add welding requirements to plugging firetubes

Subgroup: Repairs and Alterations

Task Group: None assigned.

Explanation of Need: The current NBIC does not have enough direction or requirements for welding tube plugs in firetubes.

January 2022 Meeting Action:

Item Number: 21-68 **NBIC Location: Part 3, S9** **Attachment 32**

General Description: Removal of "final inspection" date from all Form R Report certifications.

Subgroup: Repairs and Alterations

Task Group: D. Kinney (PM)

Explanation of Need: To remove the unnecessary date requirement and eliminate confusion regarding what is the "final inspection" as it relates to repairs and alterations. The term "final inspection" is not defined in the NBIC, and the corresponding date has no bearing on the act and intent of the form certification.

January 2022 Meeting Action:

Item Number: 21-70 **NBIC Location: Part 3, Table 2.3** **Attachment 62**

General Description: Updating Table 2.3 in Part 3 with newest SWPSs

Subgroup: Repairs and Alterations

Task Group: J. Sekely (PM)

Explanation of Need: 13 SWPSs have been updated and approved by AWS, and the list of SWPSs in Table 2.3 will need to be updated to reflect these changes.

January 2022 Meeting Action:

Item Number: 21-71 **NBIC Location: Part 3, 3.4.9** **Attachment 63**

General Description: Remove the mechanical portion of tube plugging from 3.3.4.9. Only address i

Subgroup: Repairs and Alterations

Task Group: None assigned.

Explanation of Need: Removing the mechanical portion of the text. Many Jurisdictions are having a difficult time enforcing that part of the NBIC

January 2022 Meeting Action:

Item Number: 21-77 **NBIC Location: Part 3, 3.3.6** **Attachment 65**

General Description: Repairs/Alterations of Impact Tested Vessels

Subgroup: Repairs and Alterations

Task Group: None assigned.

Explanation of Need: There is an urgent need to address these concerns as the repair firms cannot comply with the existing wording in 3.3.6. The plan is to incorporate this item into the 2023 Edition of Part 3 and propose a corresponding Intent Interpretation that would provide guidance to NBIC users as soon as possible.

January 2022 Meeting Action:

Item Number: 21-80 **NBIC Location: Part 3, 3.3.3 h) 2)** **Attachment**

General Description: Mechanical Replacement of Shell or Head

Subgroup: Repairs and Alterations

Task Group: None assigned.

Explanation of Need: This Code revision (corresponding to interpretation item 21-79) would provide clarity to NBIC users and address whether mechanical replacement of these components is considered a repair.

January 2022 Meeting Action:

Item Number: 21-78	NBIC Location: Part 2, S2.13.9.5 e)	Attachment Page 67

General Description: Alternative Weld Joint For Historical Boiler Barrel Replacement

Subgroup: Historical
Task Group: None assigned

Background: Historical boilers were manufactured with riveted joints, however in many cases it's more practical to use welded joints when restoring historical boilers. However, ASME Section I does not allow fillet welded lap joints when connecting replacement barrels to the wrapper sheet. The strength of a double fillet welded lap joint has proven to be equal, if not greater in strength than riveted joint designs and this proposal will introduce this type of joint as an alternative to riveted lap joints.

January 2022 Action:

Item Number: 21-82	NBIC Location: Part 3, 3.3.3 s)	Attachment 68

General Description: Examples of Repairs

Subgroup: Repairs and Alterations

Task Group: R. Underwood (PM).

Explanation of Need: Adding "repair" to 3.3.3(s) would then address use of different weld material. Currently 3.3.3(s) only addresses replacement of the part, not repair (Repair is addressed in 3.3.3(r)).

January 2022 Meeting Action:

b. Subcommittee Pressure Relief Devices

i. Errata

NBIC Location of Error: Part 4, 2.4.4.3 b)	Attachment Page 70

General Description: Last sentence in Part 4, 2.4.4.3

Task Group: T. Beirne

Explanation of Need: Item 17-128 was approved for the 2021 NBIC and included identical changes for Parts 1 and 4. However, in the publishing process the last sentence of Part 4, 2.4.4.3 was not deleted and does not match Part 1, 3.9.4.3 b).

January 2022 Meeting Action:

ii. Interpretations

Item Number: 21-62	NBIC Location: Part 4, 4.8.5.4 i) 3)	Attachment Page 72
General Description: Verification of existing spring during repair activities **Task Group:** None assigned **Explanation of Need:** This requirement has created an administrative requirement that potentially prevents a VR Stamp holder from applying the "VR" stamp to valves they have repaired. The requirement is negatively impacting owners, and jurisdictions that enforce the NBIC Part 4. This clause introduces a unique requirement in the BPV industry to confirm that code material in a Code stamped item be verified and traceable at all time after the item is ASME code stamped but the verification can only be provided by the manufacturer. Historically, any valve received or worked on that was sealed by a VR Stamp holder or in the case of an initial repair the ASME assembler was deemed to be Code compliant, and no further verification was needed recognizing the validity and continuity of the ASME and VR quality programs. It is clearly understood that if a spring, or any other critical part is deemed necessary to be replaced during a repair the manufactures verification is required and justifiable. **January 2022 Meeting Action:**		

iii. Action Items – Old Business

Item Number: NB15-0305	NBIC Location: Part 4	Attachment Page 73
General Description: Create Guidelines for Installation of Overpressure Protection by System Design. **Task Group:** B. Nutter, A. Renaldo, D. Marek (PM), D. DeMichael, J. Wolf **July 2021 Meeting Action:** Ms. Brodeur presented a progress report for this item.		

Item Number: NB15-0307	NBIC Location: Part 4	Attachment Page 75
General Description: Create Guidelines for Repair of Pin Devices. **Task Group:** D. McHugh (PM), A. Renaldo, T. Tarbay, R. McCaffrey, J. Simms, C. Beair **July 2021 Meeting Action:** Ms. Brodeur presented a progress report for this item.		

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 **July 2021 Meeting Action:** Ms. Brodeur presented a progress report for this item.		

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

July 2021 Meeting Action: Ms. Brodeur presented a progress report for this item.

Item Number: 19-37	NBIC Location: Part 4, 4.3.1 c) 4)	No Attachment

General Description: Origin of Replacement Parts for Pressure Relief Devices

Task Group: A. Cox (PM), T. Patel, P. Dhobi, J. Simms

Explanation of Need: VR Holders are required to obtain a Certificate of Compliance when they purchase Replacement Critical Parts from longtime PRV Manufacturer's Representatives. This is prevalent in the Midstream Oil & Gas Sector. Several small VR Holders in this Sector of the Energy Industry have expressed their desire to make this issue less cumbersome because the Manufacturers of the majority of PRVs they repair do not have Assemblers.

July 2021 Meeting Action: Ms. Brodeur presented a progress report for this item.

Item Number: 19-83	NBIC Location: Part 4, 4.7.5	Attachment Page 116

General Description: Address Alternate Pressure Relief Valve Mounting Permitted by ASME CC2887-1

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

Explanation of Need: ASME Code Case 2887-1 permits the installation of pressure relief valves below a low mass water tube boiler or water heater under certain conditions. This set of conditions and alternate location should be addressed in the NBIC as the use of low mass water tube boilers and water heaters becomes more widespread.

July 2021 Meeting Action: Ms. Brodeur presented a progress report for this item.

Item Number: 20-85	NBIC Location: Part 4, 3.2.6	No Attachment

General Description: Add language to Part 4, 3.2.6 to define test intervals for thermal fluid heater PRDs

Subgroup: PRD

Task Group: B. Nutter (PM), T. Patel, D. Schirmer, J. Wolf

Explanation of Need: The proposed language comes from work done on action item 19-88.

July 2021 Meeting Action: Ms. Brodeur presented a progress report for this item.

Item Number: 21-05	NBIC Location: Part 4, 3.3 & 4.8	Attachment Page 121

General Description: Mandatory Shop Audits for VR & T/O Certificate Holders

Subgroup: PRD

Task Group: A. Donaldson (PM), A. Cox, J. Simms, P. Dhobi, T. Tarbay, D. Marek

Explanation of Need: There has long been a requirement for an Annual Audit of Field Activities for VR and, more recently, T/O Activities. This same opportunity for improvement should be extended to Shop Activities that involve for T/O or VR Repair, as applicable, are properly performed and documented.

July 2021 Meeting Action: Ms. Brodeur presented a progress report for this item.

Item Number: 21-08	NBIC Location: Part 4, S4.4	No Attachment

General Description: Additional guidance for tank vent repairs

Subgroup: PRD

Task Group: D. DeMichael (PM), B. Donalson, B. Nutter, K. Beise, J. Grace

Explanation of Need: The recently approved S4.4, "Weight Loaded Vents," provided new guidance for tank vent repairs. Several additional topics need to be addressed to enhance the guidance. These topics include: 1) Suggested test equipment and configuration for the prescribed tank vent testing. 2) Minimum requirements for replacement parts, 3) Guidance for painting tank vent components.

July 2021 Meeting Action: Ms. Brodeur presented a progress report for this item.

Item Number: 21-18	NBIC Location: Part 4, 3.2.6	Attachment Page 124

General Description: Pressure Tests for Pressure Relief Valve Repair Parts

Subgroup: PRD

Task Group: J. Simms (PM), T. Tarbay, A. Donaldson, D. DeMichael, T. Patel, B. Nutter

Explanation of Need: Pressure relief valve manufacturers must produce valve parts that comply with ASME Code requirements to be able to apply the ASME Symbol Stamp and Designator to a new valve. These parts are the same that are sold as repair parts. The logistic issues to fabricate and maintain an inventory of spare parts not complying with ASME Code requirements is significant versus producing all parts in compliance with code. Consequently, why have a pressure test requirement for parts purchased from the valve manufacturer for those certificate holders who chose to buy parts produced by the manufacturer?

July 2021 Meeting Action: Ms. Brodeur presented a progress report for this item.

iv. New Items:

Item Number: 21-36	NBIC Location: Part 4, 3.3.3.4 i)	Attachment Page 126

General Description: Add Test Details to NBIC Part 4, 3.3.3.4 i) Valve Adjustment and Sealing

Subgroup: PRD

Task Group: None assigned

Explanation of Need: There is no reference in the T/O requirements for Set Pressure Testing, use of proper Test Fluid or Seat Tightness unless and until a minor adjustment is required. This is surely the intent, but it is not clearly specified as it is in the current VR requirements.

January 2022 Meeting Action:

Item Number: 21-49	NBIC Location: Part 4, 3.3.3.4 l) 5)	Attachment Page 127

General Description: Change 3.3.3.4 l) 5) to be consistent with 4.8.5.4 n) 5)

Subgroup: PRD

Task Group: None assigned

Explanation of Need: The intent was that the changes to a certificate holder's QC Manual would be accepted prior to being implemented. This change in text clarifies the intent.

January 2022 Meeting Action:

Item Number: 21-51	NBIC Location: Part 4, Supplement 3	Attachment Page 129

General Description: Clarify relief valve term to be pressure relief valve in Supplement 3

Subgroup: PRD
Task Group: None assigned

Explanation of Need: Several places refer to relief valve or valve. Should be pressure relief valve to be consistent with the rest of the book.

January 2022 Meeting Action:

Item Number: 21-52	NBIC Location: Part 4, 2.5.3 a) & Part 1, 4.5.3 a)	Attachment Page 131

General Description: Incorrect paragraph reference at end of Part 4 2.5.3 a) and Part 1 4.5.3 a)

Subgroup: PRD

Task Group: None assigned

Explanation of Need: Paragraph reference at end of Part 4, 2.5.3 a) and Part 1, 4.5.3 a) should be 2.5.6 e) and 4.5.6 e) not e)2) since all of the requirements of e apply to isolation valves not just e)2)

January 2022 Meeting Action:

Item Number: 21-59	NBIC Location: Part 4, 3.2.6.1	No Attachment

General Description: Deferral of inspection due dates (pressure relieving devices NBIC PART IV)

Subgroup: PRD

Task Group: None assigned

Explanation of Need: Since the code has clearly recommended inspection frequency intervals for the different classes of pressure relief devices, it shall have the requirements related to the deferral of due dates. The inspection due date deferrals are usually not considered but in exceptional cases where operating plant may not be able to handover the device due to some practical limitations or the turnaround frequency of the plant is extended due to stakeholders' requirements etc. The owner is usually ensuring that a deferment is not posing any significant EHSS risk by proper risk analysis but a clarity from code on the minimum or maximum duration the device can be deferred will add a great value in decision making. There are some codes which have added deferment clauses such as API 510 but the NBIC is always having precedence in this subject and shall have statement added to its code.

January 2022 Meeting Action:

Item Number: 21-61	NBIC Location: Part 4, 3.3.4	No Attachment

General Description: Audit Requirements for the T/O holder

Subgroup: PRD

Task Group: None assigned

Explanation of Need: Opened as a result of a Subgroup PRD ballot comment from item 21-05 (Shop audits for VR certificate holders). The comment recommended adding requirements specifically for organizations that are T/O only.

January 2022 Meeting Action:

Item Number: 21-63	NBIC Location: Part 4, 4.7.2	Attachment Page 132

General Description: Require unique identifier marked on Pilots in addition to main valves

Subgroup: PRD

Task Group: None assigned

Explanation of Need: The 2021 Edition of ASME BPVC Section XIII requires pilots of pilot operated pressure relief valves be marked with a unique identifier that matches the main valve (Section I has similar approved text for the 2023 Edition). This should be addressed for VR nameplates as well since pilots can be replaced as VR operation.

January 2022 Meeting Action:

Item Number: 21-72	NBIC Location: Part 4, 4.7.2 b)	Attachment Page 133

General Description: Remove reasons for changes in 4.7.2 b) 6) and 7)

Subgroup: PRD

Task Group: None assigned

Explanation of Need: Capacity could change for reasons other than set pressure or service fluid change (for example error or superimposed back pressure for liquid valve being introduced). Type/Model numbers can change for reasons other than a conversion. Sometimes manufacturers include set pressure in the type or model number. A set pressure change is not considered a conversion. Also, error correction could be a reason.

January 2022 Meeting Action:

Item Number: 21-73	NBIC Location: Part 4, 4.7.3	Attachment Page 134

General Description: Simplify paragraph 4.7.3

Subgroup: PRD

Task Group: None assigned

Explanation of Need: Subparagraphs a) through d) are repetitive and can be consolidated to simplify the overall requirement of if changes are made, they should be marked out and left legible.

January 2022 Meeting Action:

Item Number: 21-76	NBIC Location: Part 4, 3.2.4.3 and Part 2, 2.5.5.3	Attachment Page 135

General Description: Update ASME paragraph reference in Part 4, 3.2.4.3 and Part 2, 2.5.5.3

Subgroup: PRD

Task Group: None assigned

Explanation of Need: ASME Section VIII Div. 1 updated pressure relief device paragraph references as a result of publishing Section XIII. UG-135 should now be UG-156

January 2022 Meeting Action:

c. Subcommittee Installation

i. Interpretations

ii. Action Items – Old Business

Item Number: NB11-1901	NBIC Location: Part 1	Attachment Page 137

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

Subgroup: FRP

Task Group: R. Smith (PM), M. Richards, S. Konopacki, D. Patten and E. Wiggins

July 2021 Meeting Action: Mr. Wiggins presented a progress report for this item.

Item Number: 20-27	NBIC Location: Part 1, 1.6.9 & S6.3	Attachment Page 145

General Description: Carbon Monoxide Detector/Alarm NBIC 2019

Subgroup: SG Installation

Task Group: E. Wiggins (PM), R. Spiker, R. Smith, G. Tompkins, S. Konopacki and R. Austin

Explanation of Need: These codes are being enforced by some jurisdictions on existing installations. Inspectors need to know what codes we need to enforce. Do the detectors have specific levels of CO when an alarm is to go off? Is there a requirement for an audible alarm or decibel level of the alarm? Where in the boiler room should the alarm/monitor be mounted?

July 2021 Meeting Action: Mr. Wiggins presented a progress report for this item.

Item Number: 20-33	NBIC Location: Part 1	No Attachment

General Description: Flow or Temp Sensing Devices forced Circulation Boilers

Subgroup: SG Installation

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

Explanation of Need: Incorporation of applicable CSD-1 requirements.

July 2021 Meeting Action: Mr. Wiggins presented a progress report for this item.

Item Number: 20-34	NBIC Location: Part 1	Attachment Page 154

General Description: Venting of gas train components

Subgroup: SG Installation
Task Group: P. Jennings (PM), M. Washington, R. Adams

Explanation of Need: Incorporation of applicable CSD-1 requirements.

July 2021 Meeting Action: Mr. Wiggins presented a progress report for this item.

Item Number: 20-39	NBIC Location: Part 1	No Attachment

General Description: Modular Boilers

Subgroup: SG Installation

Task Group: T. Clark (PM), M. Downs, M. Wadkinson, D. Patten, R. Austin

Explanation of Need: Incorporation of applicable CSD-1 requirements.

July 2021 Meeting Action: Mr. Wiggins presented a progress report for this item.

Item Number: 20-41	NBIC Location: Part 1	Attachment Page 169

General Description: Safety and Safety Relief Valves for Steam and Hot Water Heating Boilers.

Subgroup: SG Installation

Task Group: E. Wiggins (PM), J. Brockman, G. Tompkins

Explanation of Need: Incorporation of applicable CSD-1 requirements.

July 2021 Meeting Action: Mr. Wiggins presented a progress report for this item.

Item Number: 20-43	NBIC Location: Part 1	Attachment Page 170

General Description: Safety Relief valve for Hot Water Supply Boilers

Subgroup: SG Installation

Task Group: W. Anderson (PM), E. Wiggins, J. Brockman

Explanation of Need: Incorporation of applicable CSD-1 requirements.

July 2021 Meeting Action: Mr. Wiggins presented a progress report for this item.

Item Number: 20-44	NBIC Location: Part 1	Attachment Page 171

General Description: CW Vacuum Boilers

Subgroup: SG Installation

Task Group: R. Spiker (PM), M. Washington, M. Byrum

Explanation of Need: Incorporation of applicable CSD-1 requirements.

July 2021 Meeting Action: Mr. Wiggins presented a progress report for this item.

Item Number: 20-62	NBIC Location: Part 1, 1.4.5.1	No Attachment

General Description: Update the National Board Boiler Installation Report

Subgroup: SG Installation

Task Group: T. Clark (PM), E. Wiggins, R. Spiker, T. Creacy, P. Jennings, G. Tompkins, and D. Patten.

July 2021 Meeting Action: Mr. Wiggins presented a progress report for this item.

Item Number: 20-86	NBIC Location: Part 1, 2.10.1 a)	Attachment Page 172

General Description: Testing and Acceptance: Boiling-out Procedure

Subgroup: SG Installation

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

July 2021 Meeting Action: Mr. Wiggins presented a progress report for this item.

iii. Action Items – New Business

Item Number: 21-55	NBIC Location: Part 1, 3.7.5.1 b)	Attachment Page 173

General Description:

Subgroup: SG Installation

Task Group: None assigned.

Explanation of Need: The inquirer manufactures a packaged pool heating system that uses a water-to-water heat exchanger to isolate the water boiler from the pool heating system loop. They do not provide stop valves between the boiler and the heat exchanger. Even though the boiler can be drained and serviced without draining or disturbing the primary system, they are told that NBIC Part 1, 3.7.5.1 mandates that isolation valves be installed on the boiler. This is a non-value-added expense to change the package design and rework existing installations. This has no impact on safety and is also consistent with the conditions and exemptions currently in 3.7.5.1 b and provides a needed clarification to the existing language.

January 2022 Meeting Action:

d. Subcommittee Inspection

i. Interpretations

Item Number: 21-65	NBIC Location: Part 2, 2.3.6.2 b) 4)	Attachment Page 175
General Description: Air receiver tank manual drain valve **Subgroup:** Inspection **Task Group:** None assigned **Explanation of Need:** The inquirer remembers this requirement some 12 years ago but could no longer find the specific code requirement. Their client wants to know where and what code provides this requirement.		
January 2022 Meeting Action:		

ii. Action Items – Old Business

Item Number: NB16-1402	NBIC Location: Part 2, New Supplement	No Attachment
General Description: Life extension for high pressure FRP vessels above 20 years **Subgroup:** FRP **Task Group:** M. Gorman (PM) **Background:** In 2016, when this item was first opened, it was assigned as an item for Part 3. Recent discussions with SC R&A and the FRP Task Group have revealed that this item is better suited for Part 2. This item has been approved by the FRP Task Group. **Scope:** The goal of this proposal is to provide a method to evaluate whether the service life of high-pressure fiber reinforced plastic pressure vessels can be extended for an additional lifetime. **July 2021 Meeting Action:** Mr. Getter presented a progress report for this item.		

Item Number: 19-46	NBIC Location: Part 2, S5	Attachment Page 179
General Description: Revisions to Yankee dryer supplement in Part 2 **Subgroup:** Inspection **Task Group:** V. Newton (PM), T. Barker, D. Lesage, J. Jessick **Explanation of Need:** Various parts of supplement 5 do not match their counterparts in Part 1, Supplement 1. **July 2021 Meeting Action:** Mr. Getter presented a progress report for this item.		

Item Number: 20-46	NBIC Location: Part 2, 5.3.2	Attachment Page 191

General Description: Updates to Forms NB-5, NB-6, & NB-7

Subgroup: Inspection

Task Group: D. Buechel (PM), M. Sansone, V. Scarcella

Explanation of Need: On the current forms NB-5, NB-6, & NB-7 there are fields that are already on the ASME Manufactures Data Report making them repetitive. Other fields that ask for in- depth technical information would be hard if not impossible for an inspector to determine and are irrelevant to the inspection process.

July 2021 Meeting Action: Mr. Getter presented a progress report for this item.

Item Number: 20-57	NBIC Location: Part 2, 4.4.1 a)	No Attachment

General Description: Evaluate revision to Part 2, 4.4 FFS scope roles and responsibilities (submitted by Mr. George Galanes).

Subgroup: Inspection

Task Group: M. Horbaczewski (PM) and B. Ray**.**

Explanation of Need: Currently, there is confusion surrounding implementation of FFS for Part 2 inspection activities, where the FFS form is located and Part 3 activities regarding Part 3, 3.3.4.8 because it references Part 2 for FFS. In addition, we need to have a Part 2 Inspection member to be assigned to assist in the development of roles and responsibilities.

July 2021 Meeting Action: Mr. Getter presented a progress report for this item.

Item Number: 20-70	NBIC Location: Part 2, S1.4.2.29	Attachment Page 178

General Description: Inspection of Furnace Slides (submitted by Mr. Mark Ray)

Subgroup: Locomotive
Task Group: M. Ray (PM)

Explanation of Need: Furnace slide supports which are locked in-place by corrosion will adversely impact the thermal expansion of the boiler and lead to staybolt breakage.

July 2021 Meeting Action: Mr. Getter presented a progress report for this item.

Item Number: 21-03	NBIC Location: Part 2, S2	No Attachment

General Description: Inspection of through stays and diagonal stays (submitted by David Rose)

Subgroup: Historical
Task Group: D. Rose (PM), R. Bryce, R. Forbes, & C. Jowett

Explanation of Need: The code is silent on the inspection of through stays and diagonal stays. Additionally, new repair methods are available from ASME that can be incorporated.

July 2021 Action: Mr. Getter presented a progress report for this item.

Item Number: 21-25	NBIC Location: Part 2	Attachment Page 197

General Description: Autoclave/Quick opening device PP (submitted by Kevin Hawes)

Subgroup: Inspection
Task Group: V. Scarcella (PM), T. Bolden, M. Horbaczewski, J. Peterson, J. Clark, W. Hackworth, M.A. Shah

Explanation of Need: Upon our AIA (Intact) QRR I produced a Power point presentation on Autoclave inspections. Your NB team leader Gary Scribner suggested I forward this inspection presentation to the NB for review of content as mention of good reference material for next NBIC edition. I have attached a copy of this PP for your considerations.

July 2021 Action: Mr. Getter presented a progress report for this item.

iii. New Items:

Item Number: 21-34	NBIC Location: Part 2, S2	No Attachments

General Description: Working Pressure Calculations for Curved Stayed Surfaces

Subgroup: Historical
Task Group: Mike Wahl (PM), R. Bryce, and T. Dillon

Background: In January 2021, Dr. Bryce initiated the conversation with the group for this topic. He is proposing the group open an item to address working pressure calculations for curved stayed surfaces. After discussiona task group was formed

July 2021 Action:

PROGRESS REPORT: R. Bryce is working on a proposal and will hopefully have something to present in January 2022.

Item Number: 21-40	NBIC Location: Part 2	Attachment Page 199

General Description: Define "Remote" in the NBIC Glossary

Subgroup: Inspection
Task Group: None assigned

Explanation of Need: With the use of indirect inspection equipment from borescopes to tethered drones/vehicles for confined space inspections, there is a need to clarify what is considered a "remote" inspection vs an "indirect" inspection.

January 2022 Action:

Item Number: 21-41	NBIC Location: Part 2, 4.2 c)	No Attachment

General Description: Requirements for NDE procedures and personnel

Subgroup: Inspection
Task Group: None assigned

Explanation of Need: Lacking qualification requirements has resulted in poor NDE.

January 2022 Action:

Item Number: 21-42	NBIC Location: Part 2, 5.3.3	No Attachment

General Description: Review ASME 579 to make sure we are aligned for FSS requirements

Subgroup: Inspection
Task Group: None assigned

Explanation of Need: FSS is a critical component of high-risk equipment and we need to make sure those that comply with ASME 579 are also in compliance with Part II.

January 2022 Action:

Item Number: 21-46	NBIC Location: Part 2, 1.3 & 9.1	No Attachment

General Description: Defining Listed and Labeled

Subgroup: Inspection
Task Group: None assigned

Explanation of Need: Main Committee asked about having these defined in the NBIC.

January 2022 Action:

Item Number: 21-47	NBIC Location: Part 2, 2.2.4 & 2.2.5	No Attachment

General Description: To provide better guidance as it relates to carbon monoxide

Subgroup: Inspection
Task Group: None assigned

Explanation of Need: Need to provide more comprehensive items to be reviewed to guide the inspector on carbon monoxide and combustion air.

January 2022 Action:

Item Number: 21-48	NBIC Location: Part 2, S2.6.3.4	Attachment Page 176

General Description: Correction of references in S2.6.3.4 a) 1) and 2).

Subgroup: Historical
Task Group: None assigned

Background: the sentences in S2.6.2 (b&c) were re-lettered sometime between 2013 and 2019 and the references back to them in S2.6.3.4 were not changed at the same time. This also applies to S2.6.3.4 a) 1 & 2. This correction may be needed in other sentences, but I have not identified the need yet.

January 2022 Action:

Item Number: 21-50	NBIC Location: Part 2, 2.3.6.4 & S7	No Attachment

General Description: Ensure IIAR PV Integrity codes are aligned with NBIC II

Subgroup: Inspection
Task Group: None assigned

Explanation of Need: NH3 growing exposure.

January 2022 Action:

Item Number: 21-56	NBIC Location: Part 2, 2.3.6.4 f) 5) c.	Attachment Page 200

General Description: Clarify what action is necessary after determining the acceptance criteria.

Subgroup: Inspection
Task Group: None assigned

Explanation of Need: There is no guidance in the Liquid Ammonia 2.3.6.4 f) 5) paragraphs for the acceptance criteria for corroded areas of considerable size as there are for dents and bulges, for example.

January 2022 Action:

Item Number: 21-66	NBIC Location: Part 2, S2.7.3.2	Attachment Page 177

General Description: Correct Water Treatment

Subgroup: Historical
Task Group: None assigned

Background: As a jurisdiction we would like to define a process for treating the water that is used in historical boilers. Historical boiler owners in the province of Manitoba are stating that corrosion inhibitors do not have a noticeable capacity for slowing the effects of corrosive compounds in non-treated water. The request for this item is triggered from a discussion with historical boiler owners in the province of Manitoba. The owners are requesting a clarification for what the expectations are for treating the water used in the historical boilers.

January 2022 Action:

10. Liaison Activities

i. American Society of Mechanical Engineers BPV Code (ASME BPV)

ii. American Welding Society (AWS)

- Mr. Jim Sekely will present a report on recent AWS activities.

11. Future Meetings

- Mr. Gary Scribner will announce the future meeting dates and locations.

12. Adjournment

Respectfully submitted,

Jonathan Ellis

Jonathan Ellis
NBIC Secretary

THE NATIONAL BOARD
OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD INSPECTION CODE COMMITTEE

ATTACHMENTS

Galanes	George	Users	Chair	07/30/2024	Details
Wadkinson	Melissa	Manufacturers	Vice Chair	07/30/2024	Details
Ellis	Jonathan		Secretary	12/30/2099	Details
Austin	Randall	Users	Member	01/30/2023	Details
Brodeur	Marianne	National Board Certificate Holders	Member	10/30/2022	Details
Getter	Jim	Manufacturers	Member	01/30/2023	Details
Hopkins	Craig	National Board Certificate Holders	Member	07/30/2022	Details
LeSage	Donnie	Jurisdictional Authorities	Member	01/30/2022	Details
Morelock	Brian	Users	Member	01/30/2023	Details
Newton	Venus	Authorized Inspection Agencies	Member	01/30/2023	Details
Patel	Thakor	Manufacturers	Member	01/30/2023	Details
Richards	H. Michael	General Interest	Member	08/30/2022	Details
Sansone	Matthew	Jurisdictional Authorities	Member	07/30/2023	Details
Seime	Trevor	Jurisdictional Authorities	Member	07/30/2023	Details
Sekely	James	General Interest	Member	08/30/2023	Details
Simmons	Timothy	Labor	Member	11/29/2024	Details
Toth	Marty	General Interest	Member	10/30/2022	Details
Washington	Milton	Jurisdictional Authorities	Member	01/30/2022	Details
Wielgoszinski	Robert	Authorized Inspection Agencies	Member	07/30/2024	Details
Wiggins	Edward	Jurisdictional Authorities	Member	07/30/2024	Details

Title	Item Number	Cycle	Assigned Subgroup
Reword to provide clarity; contradictory requirement Part 3; 3.2.2 e)	19-16	A	Subgroup Repairs/Alterations
Review and clarify requirements for documented training program for VR	19-2	A	Subgroup Pressure Relief Devices
Add practicable to the glossary and it's definition	20-51	A	Subgroup Repairs/Alterations
Add practicable to the glossary and it's definition	20-51	A	Subgroup Repairs/Alterations
Add practicable to the glossary and it's definition	20-51	A	Subgroup Repairs/Alterations
Add practicable to the glossary and it's definition	20-51	A	Subgroup Repairs/Alterations
Examples of repairs	20-55	A	Subgroup Repairs/Alterations
Correct Paragraph numbers in Section 3 Related to T/O Requirements	20-58	A	Subgroup Pressure Relief Devices
Charpy Impact Test Temperature for Welding Method 2	20-75	A	Subgroup Repairs/Alterations
Liquid Pressure Testing of Alterations	20-80	A	Subgroup Repairs/Alterations
Reporting of Form NB-136	20-82	A	Subgroup Inspection
Make it mandatory to install a temperature sensor in the stack of a	20-94	A	Subgroup Installation
Update of SWPS Table 2.3	21-11	A	Subgroup Repairs/Alterations
UT Thickness Check for a New Boiler	21-20	A	Task Group Historical Boilers
Prepare a guide for repair of tank vents	NB12-0901	A	Subgroup Pressure Relief Devices
Prepare a guide for repair of tank vents	NB12-0901	A	Subgroup Pressure Relief Devices
Create Guidelines for Installation of Pressure Relief Devices for Organic	NB15-0308	A	Subgroup Pressure Relief Devices
Create Guidelines for Installation of Pressure Relief Devices for Organic	NB15-0308	A	Subgroup Pressure Relief Devices
Review testing requirements for inservice testing of pressure relief	NB15-0321	A	Subgroup Pressure Relief Devices
Revision adding heat exchanger tubes with an outside diameter of ¾" or	18-100	B	Subgroup Repairs/Alterations
Permanent nameplate removal from pressure vessel being removed from	18-43	B	Subgroup Inspection
Riveted Stay bolt dimensions	18-6	B	Task Group Locomotive Boilers
Additional requirements for thermal fluid heaters	19-88	B	Subgroup Inspection
Revision of the definition of ANIA in Section 9 of all Parts	20-47	B	Subgroup Repairs/Alterations
Welds Across Riveted Lap Seams	20-69	B	Task Group Locomotive Boilers
Remove S6.15.1 - It is redundant and is not needed	20-88	B	Subgroup Repairs/Alterations
Add verbiage for use of Valves that do not have adjustable packing	21-01	B	Subgroup Installation
Contacting jurisdiction regarding de-rates.	21-30	B	Subgroup Repairs/Alterations
Contacting jurisdiction regarding de-rates.	21-30	B	Subgroup Repairs/Alterations
Review inspection requirements for pressure vessels designed for high	18-63	C	Subgroup Inspection
Review 1.6 requirements for ANI's & ANII's to hold the R endorsement	19-68	C	Subgroup Repairs/Alterations
Use of Personnel from another VR Certificate Holder to perform VR	19-71	C	Subgroup Pressure Relief Devices
inspecting riveted joints for failure	19-84	C	Task Group Historical Boilers
Review and clarify requirements training program for T/O holders	20-56	C	Subgroup Pressure Relief Devices
Temporary nameplate removal for external inspection.	20-59	C	Subgroup Inspection
Revise Supplement 8	20-61	C	Subgroup Repairs/Alterations
Safety Valve Sizing (Correct Use of Capacity Charts)	20-71	C	Task Group Locomotive Boilers
Add nomenclature to formula in Part 2, S10.10.4 c)	20-79	C	Task Group Fiber-Reinforced Pressure Vessels
Encapsulation sect. to remove para. conflicts to other referenced codes	21-26	C	Subgroup Repairs/Alterations

GTAW — Gas Tungsten Arc Welding	
Title	**Designation: Year**
Standard Welding Procedure Specification for Gas Tungsten Arc Welding of Carbon Steel, (M-1/P-1, Group 1 or 2), 3/16 in. ~~(5 mm)~~ through 7/8 in. ~~(22 mm)~~ Thick, ER70S-2 and ER70S-3, in the As-Welded Condition, ~~With or Without Backing~~ Primarily Plate and Structural Applications.	B2.1-1-002: 2020~~B2.1-002-90, B2.1-002-90(R2006) and B2.1-1-002-90R~~
Standard Welding Procedure Specification for Gas Tungsten Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 in. ~~(3.2 mm)~~ through 1 ½ ~~3/4~~ in. ~~(19 mm)~~ Thick, ER70S-2,	B2.1-1-207: 2019~~B2.1-1-207-96~~
Standard Welding Procedure Specification for Gas Tungsten Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 in. ~~(3.2 mm)~~ through 1 ½ in. ~~(38 mm)~~ Thick, ER70S-2, As-Welded or PWHT Condition, Primarily Pipe Application.	B2.1-1-207: 2019~~B2.1-1-207-96 (R2007)~~
Standard Welding Procedure Specification for Gas Tungsten Arc Welding (Consumable Insert) of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 in. ~~(3.2 mm)~~ through 1 ½ ~~3/4~~ in. ~~(19 mm)~~ Thick, INMs1 and ER70S-2, As-Welded or PWHT Condition, Primarily Pipe Application.	B2.1-1-210-96
Standard Welding Procedure Specification for Gas Tungsten Arc Welding with Consumable Insert Root of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 in. ~~(3.2 mm)~~ through 1-1/2 in. ~~(38 mm)~~ Thick, INMs-1, ER70S-2, As-Welded or PWHT Condition, Primarily Pipe Applications.	B2.1-1-210: 2012~~B2.1-1-210:2001 R2012~~

Combination of Carbon Steel (M-1/P-1 Material) To Austenitic Stainless Steel (M-8/P-8 Material)

SMAW — Shielded Metal Arc Welding	
Title	**Designation: Year**
Standard Welding Procedure Specifications for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Groups 1 or 2) to Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 in. ~~(3.2 mm)~~ through 1 ½ in. ~~(38 mm)~~ Thick, E309(L)-15, -16, or -17, As-Welded Condition, Primarily Pipe Applications.	B2.1-8-216: 2012~~B2.1-1/8-228:2002R2013~~

PROPOSED INTERPRETATION

Item No.

21-39

Subject/Title

Routine repair scope

Project Manager and Task Group

Source (Name/Email)

Paul Shanks / paul.shanks@onecis.com

Statement of Need

Some R-certificate holders and AIAs are making huge (100 square feet) weld metal buildup type routine repairs on the basis that the components being built up are only 5" tubes and 3.3.2 e) 1) says welded repairs to 5" tubes are routine. As 3.3.2 e) includes "shall be limited to" shouldn't exceeding any one of the listed limitations preclude the routine repair approach.

Background Information

Repairs that exceed the limit listed in 33.2 e) 3) are being conducted which potentially places the public in harms way.

Proposed Question

Q1, In a boiler water wall which has been subject to wastage and requires weld metal build up, does the fact that the tubes are 5" or smaller mean that said build up is always routine regardless of the area involved? Q2 or if the area of weld build up exceeds 100in2 does the size and nature of the component being repaired become irrelevant?

Proposed Reply

A1, No A2, Yes

Committee's Question 1

Committee's Reply 1

Rationale

Committee's Question 2

Committee's Reply 2

Rationale

PROPOSED INTERPRETATION

Item No.

21-57

Subject/Title

Routine Repairs of Section VIII Div 1 built to Appdx 46

Project Manager and Task Group

Trevor Seime

Source (Name/Email)

Terrence Hellman / thellman@nationalboard.org

Statement of Need

Routine Repairs are not allowed for ASME Sect. VIII Div. 2 or 3 vessels. Routine Repairs should not be allowed for Div. 1 vessels built using the design considerations of Division 2 to establish the thickness and other design details of a component for a Section VIII, Division 1 pressure vessel.

Background Information

None.

Proposed Question

Are routine repairs permitted for ASME Section VIII Div. 1 vessels built in accordance with ASME Sect. VIII Div. 1 Appendix 46?

Proposed Reply

No.

Committee's Question 1

Are routine repairs permitted for ~~ASME Section VIII Div. 1 vessel~~ components ~~built~~ designed in accordance with ASME Sect. VIII, Div. 1, Appendix 46?

Committee's Reply 1

No.

Rationale

Routine Repairs are not allowed for ASME Sect. VIII Div. 2 or 3 vessels; therefore Routine Repairs should not be allowed for Div. 1 vessel components built using the design considerations of Division 2 to establish the thickness and other design details of a component for a Section VIII, Division 1 pressure vessel.

Committee's Question 2

Committee's Reply 2

Rationale

PROPOSED INTERPRETATION

Item No.

21-60

Subject/Title

UDS requirements for repairs and alterations for Divisions 2 & 3

Project Manager and Task Group

Source (Name/Email)

Mark Lower / lowermd@ornl.gov

Statement of Need

Is it the intent of interpretation 19-14 to prohibit the R-Certificate holder from recreating a UDS while still allowing the user to create the UDS? If yes, could the R-Certificate holder serve as the user's designated agent to recreate the UDS? Although this interpretation applies specifically to alterations, would this interpretation also be applicable to performing repairs (see 3.3.5.2(a))?

Background Information

Interpretation 19-14 states a UDS cannot be recreated when lost/destroyed. It is not clear how repair organizations will comply with the requirements of 3.4.5.1(a). However, it appears the user would be allowed to alter an existing UDS based on current parameters as noted in 3.4.5.1(b).

Proposed Question

Q: May a User's Design Specification be generated for the purpose of ASME Section VIII Div 2 or Div 3 vessel repairs or alterations by the user or their designated agent in the event the original UDS was lost/destroyed?

Proposed Reply

A: Yes

Committee's Question 1

Committee's Reply 1

Rationale

Committee's Question 2

Committee's Reply 2

Rationale

PROPOSED INTERPRETATION

Item No.

21-64

Subject/Title

Repair or Alteration activity allowed prior to Certification

Project Manager and Task Group

Source (Name/Email)

Terrence Hellman / thellman@nationalboard.org

Statement of Need

Applicants for the "R" Certificate are unclear if the NBIC allows for any activities to be performed prior to certification, especially since ASME does allow it.

Background Information

Below are references from the NB-415 and 2019 NBIC supporting A1 and A2. Per NB-415: 3.8 When all requirements have been met, a Certificate of Authorization will be issued evidencing permission to use the “R” Symbol Stamp. The Certificate of Authorization shall expire on the triennial anniversary date. Per NBIC: 1.4 ACCREDITATION a) Organizations performing repairs or alterations to pressure-retaining items shall be accredited as described in this section, as appropriate for the scope of work to be performed. 1.4.1 ACCREDITATION PROCESS a) The National Board administers accreditation programs for authorization of organizations performing repairs and alterations to pressure-retaining items in accordance with NB-415, Accreditation of “R” Repair Organizations. b) Any organization may apply to the National Board to obtain a Certificate of Authorization for the requested scope of activities. A review shall be conducted to evaluate the organization’s quality system. The individual assigned to conduct the evaluation shall meet the qualification requirements prescribed by the National Board. Upon completion of the evaluation, any deficiencies within the organization’s quality system will be documented and a recommendation will be made to the National Board regarding issuance of a Certificate of Authorization. c) As part of the accreditation process, an applicant’s quality system is subject to a review. National Board procedures provide for the confidential review resulting in recommendations to issue or not issue a Certificate of Authorization. 1.5.1 OUTLINE OF REQUIREMENTS FOR A QUALITY SYSTEM FOR QUALIFICATION FOR THE NATIONAL BOARD “R” CERTIFICATE OF AUTHORIZATION d) Statement of Authority and Responsibility A dated Statement of Authority and Responsibility, signed by a senior management official of the organization, shall be included in the manual. Further, the Statement shall include: 1) A statement that all repairs or alterations carried out by the organization shall meet the requirements of the NBIC and the Jurisdiction, as applicable; n) Acceptance and Inspection of Repair or Alteration 1) The manual shall specifically indicate that before the work is started, acceptance of the repair/alteration shall be obtained from an Inspector who will make the required inspections and confirm NBIC compliance by signing and dating the applicable NBIC Report Form upon completion of the work.

Proposed Question

Q1 - Can a new applicant's demonstration item be a welded repair to a PRI in accordance with the original code of construction prior to the applicant holding the "R" Certificate of Authorization? Q2 - Can the demonstration item in Q1 be stamped with the "R" Stamp pending a successful review if the Repair/Alteration activity is authorized by and has the required in-process involvement of the company's Repair Inspector?

Proposed Reply

A1 - No. No Repair/Alteration activities can be performed prior to holding an "R" Certificate of Authorization. A2 - No.

Committee's Question 1

Committee's Reply 1

PROPOSED INTERPRETATION

Item No.

21-74

Subject/Title

ASME Sect VIII, Div 1 Design Personnel Requirements and NBIC Repairs/Alts

Project Manager and Task Group

Source (Name/Email)

Luis Ponce / lponce@nationalboard.org

Statement of Need

Many have asked what, if any, impact the new ASME VIII-1 Appendix 47 design personnel requirements will have on NBIC repairs and alterations.

Background Information

Paragraphs 3.3.5 (Repairs to VIII-2 PRIs) and 3.4.5 (Alterations to VIII-2 PRIs) contain the statement that reads in part, "The repair/alteration plan shall be reviewed and certified by an engineer meeting the criteria of ASME Section VIII, Division 2 or 3, as appiicable...". The argument can be made that this would also apply to ASME Section VIII Division 1 alterations too in light of new Appendix 47, but not to repairs because there are no design functions associated with repairs in the NBIC.

Proposed Question

1. Are the 2021 ASME Section VIII, Division 1 Mandatory Appendix 47 design personnel requirements applicable to NBIC alterations to ASME Section VIII, Division 1 PRIs ? 2. Are the 2021 ASME Section VIII, Division 1 Mandatory Appendix 47 design personnel requirements applicable to NBIC repairs to ASME Section VIII, Division 1 PRIs ?

Proposed Reply

1 Yes, same as the NBIC requirements for ASME Secton VIII, Division 2 or 3 alterations. 2 No, there are no design functions associated with repairs.

Committee's Question 1

Committee's Reply 1

Rationale

Committee's Question 2

Committee's Reply 2

Rationale

PROPOSED INTERPRETATION

Item No.

21-75

Subject/Title

Routine Repairs

Project Manager and Task Group

Source (Name/Email)

Logan Somers / lsomers@harder.com

Statement of Need

The wording "but does not include nozzles to pressure-retaining items" could lead onto interpreting the nozzle as a whole including the joint attaching the nozzle to the PRI.

Background Information

When discussing scheduling of repairs this information is used by the owner to determine when the unit may be brought down for repair based on the availability of the Inspector.

Proposed Question

May the identical replacement of a waisted flange at the end of a nozzle off a PRI be considered a routine repair in accordance with the requirements of 3.3.2 when only the flange is replaced and not the joint attaching the nozzle to the PRI?

Proposed Reply

No

Committee's Question 1

May the ~~identical~~ replacement in kind of a ~~waisted~~ flange at the end of a nozzle, NPS 5 (DN 125) in diameter or smaller, ~~off~~ attached to a PRI be considered a routine repair in accordance with ~~the requirements of~~ Part 3 Section 3.3.2 (e) (1) when neither postweld heat treatment nor NDE other than visual is required and only the flange is replaced and not the joint attaching the nozzle to the PRI?

Committee's Reply 1

Yes

Rationale

The replaced flange would be considered a fitting in the category of Part 3 Section 3.3.2 (e) (1).

Committee's Question 2

Committee's Reply 2

Rationale

PROPOSED INTERPRETATION

Item No.

21-79

Subject/Title

Mechanical Replacement of Shell or Head

Project Manager and Task Group

Source (Name/Email)

Robert Underwood / robert_underwood@hsb.com

Statement of Need

This interpretation and corresponding Code revision would provide clarity to NBIC users and address whether mechanical replacement of these components is considered a repair.

Background Information

There are two conflicting NBIC interpretations relating to mechanical replacement of parts. Interpretation 01-29 states that NBIC neither requires nor prohibits documenting mechanical repair installation on a Form R-1. Recently passed interpretation 19-11 states that mechanical replacement of pressure retaining components in ASME Section VIII, Div. 3 vessels are considered a repair activity. 19-11 cites paragraph 3.3.3 which provides examples of repairs. Paragraph 3.3.3(h)(2) specifically states that replacement of head or shell in accordance with the original design. It does not specify whether head was replaced by welding or mechanical attachment.

Proposed Question

Is mechanical replacement of a shell or head of a pressure retaining item considered a repair activity?

Proposed Reply

Yes, see Part 3, 3.3.3(h).

Committee's Question 1

Committee's Reply 1

Rationale

Committee's Question 2

Committee's Reply 2

Rationale

PROPOSED INTERPRETATION

Item No.

21-81

Subject/Title

Repairs/Alterations of Impact Tested Vessels (Intent Interp)

Project Manager and Task Group

Source (Name/Email)

Robert Underwood / robert_underwood@hsb.com

Statement of Need

There is an urgent need to address these concerns as the repair firms cannot comply with the existing wording in 3.3.6. The purpose of this Intent Interpretation is to take the approved revisions to the 2023 NBIC Part 3 and provide immediate guidance to users involved in the repair and alteration activities of impact tested vessels.

Background Information

Existing paragraph 3.3.6 contains some requirements that the repair firm cannot comply with such as determining the heat treated condition and the notch toughness characteristics of the material to be repaired. It also contains references to dead links in the NBIC that provide no guidance to the repair firm. There is a corresponding item that is proposing elimination of the requirements of knowing the heat treated condition and the notch toughness characteristics of the material to be repaired and simply refer back to the original construction code in regards to WPS qualification. The intent interpretation would use the approved revisions and provide immediate guidance to users involved in the repair and alteration activities of impact tested vessels.

Proposed Question

Q1: When performing repair and alteration activities to pressure retaining items that have been impact tested, is it the intent that the test material used to qualify the welding procedure be of the same heat treated condition of the material being repaired? Q2: Is it the intent that the notch toughness of the material to be repaired be verified prior to performing a repair/alteration activity on a pressure retaining item that has been impact tested?

Proposed Reply

Replay 1: No, qualification of the welding procedure shall be in compliance with the following minimum requirements: a) Welding procedures used for repairs shall be qualified with impact testing when required by the original code of construction. The requirements for impact testing shall be in accordance with the rules of the original code of construction except that vessel (production) impact testing is not required. b) The test material for the welding procedure qualification with impact testing shall be of the same P-number and Group number as the material being repaired. Replay 2: No, qualification of the welding procedure shall be in compliance with the following minimum requirements: a) Welding procedures used for repairs shall be qualified with impact testing when required by the original code of construction. The requirements for impact testing shall be in accordance with the rules of the original code of construction except that vessel (production) impact testing is not required. b) The test material for the welding procedure qualification with impact testing shall be of the same P-number and Group number as the material being repaired.

Committee's Question 1

Committee's Reply 1

Rationale

Committee's Question 2

1.5 QUALITY SYSTEM

A holder of a National Board *Certificate of Authorization* shall have and maintain a written Quality System. The Quality System shall identify the processes necessary to satisfactorily meet the requirements of the NBIC and shall be available for review. The Quality System may be in the form of a manual ~~or~~and may consist of several documents~~brief or voluminous~~, depending on the projected scope of work. The Quality System~~It~~ shall be treated confidentially by the National Board.

1.5.1 OUTLINE OF REQUIREMENTS FOR A QUALITY SYSTEM FOR QUALIFICATION FOR THE NATIONAL BOARD "R" *CERTIFICATE OF AUTHORIZATION*

The following is a guide for identifying features ~~is a guide for required features~~ which should be covered in the written Quality System as outlined in this section and ~~of a Quality System which shall be included in the organization's Quality System Manual. As a minimum, each organization~~ shall be ~~address~~ documented ~~the required features~~ relative to the scope of work ~~to be~~ performed ~~by~~within the Certificate Holder's ~~within. the O~~organization's Quality System. ~~shall explain their~~The intent, capability and applicability for each required feature shall be stated.~~outlined in this section.~~ Work may be subcontracted provided the necessary controls are clearly defined for maintaining full responsibility for code compliance by the National Board ~~repair organization~~Certificate Holder certifying the work.

a) Title Page

The title page shall contain the ~~organization's~~ Certificate Holder's legal name, ~~accepted abbreviation,~~ physical address, and ~~scope of activities~~Scope of Work.

The scope of work shall clearly indicate the type of repairs and/or alterations the Certificate Holder is capable of and intends to carry out. The scope of work indicated shall include the following, as applicable.

- Repairs Only at either Shop or Field or Both
- Alterations Only at either Shop or Field or Both
- Repairs and Alterations at either Shop or Field or Both
- Metallic Repairs
- Non-Metallic Repairs
- Design Only

b) Content Page

The Quality System shall contain a page listing the contents of the manual by section, number (if applicable), revision level, and date of each section, as required for manual control. ~~The content page shall list the activities described for in the Quality System so that each subject or document, number (if applicable), and revision level is clearly identified.~~

~~c) Scope of Work~~
~~The scope of work shall clearly indicate the type of repairs and/or alterations the Certificate Holder organization is capable of and intends to carry out. The scope of work indicated shall include the following, as applicable.~~

~~Repairs Only at either Shop or Field or Both~~
~~Alterations Only at either Shop or Field or Both~~
~~Repairs and Alterations at either Shop or Field or Both~~
~~Metallic Repairs~~
~~Non-Metallic Repairs~~
~~Design Only~~

~~d~~c) Statement of Authority and Responsibility

A dated ~~dated~~ *Statement of Authority and Responsibility*, ~~signed by a senior management official of the organization,~~ shall clearly identify that the ~~be included in the~~ Quality System has the full support of management and endorsed by signature of a senior management official. ~~Further, the~~The *Statement* shall also include:

1) A statement that all repairs or alterations carried out by the Certificate Holder ~~organization~~ shall meet the requirements of the NBIC and the Jurisdiction, as applicable;

2) The title of the individual who has the authority and responsibility charged with the development and ~~ensuring the Quality System is~~ implementation~~ed~~ of the Quality System and ~~as described, and confirming~~ the freedom to identify quality problems, and to initiate, recommend and provide solutions and when required, stop or prohibit work from continuing.

3) A statement that ~~if there are~~ conflicts or~~is a~~ disagreements with ~~in~~ the implementation of the Quality System, ~~will~~shall be brought to the attention of the Certificate Holder's ~~organization's~~ senior management official~~the matter is to be referred~~ for a resolution ~~to a higher authority and shall be resolved in a manner~~ that will not conflict with code, jurisdiction/regulatory authority or Quality System requirements~~; and~~.

~~e~~d) ~~Manual~~ Quality System Control

The Quality System~~manual~~ shall define how~~include the necessary provisions for~~ revisions~~g~~ of individual ~~subjects~~sections, exhibits or documents will be identified, and how distribution and retrieval~~issuing documents~~ will be achieved to ensure~~keep the manual current~~ only the latest accepted revisions are available for use. In addition, the following shall be documented:

1) The title of the individual responsible for the preparation and~~authorized to~~ approval~~e~~ of the Quality System including review of code editions, standards, and jurisdictional requirements.

2) ~~revisions shall be included in the manual.~~ Acceptance from the ~~Revisions must be accepted by the~~ Authorized Inspection Agency prior to issuance and implementation of the Quality System~~manual and its implementation~~.

~~f~~e) Certification

When electronic certification of documents is used, the Quality System shall include provisions describing the controls and safe guards that are employed to ensure the integrity of the certification.

~~g~~f) Organization

The Quality System shall include ~~A~~an organizational chart which~~shall be described included for in the manual. It shall~~ reflects actual levels of authority~~-~~ and lines of communication associated with ~~the~~ functional job titles identified.~~-~~ In addition, roles and responsibilities associated with ~~the~~ functional job titles identified within the ~~organizational chart~~Quality System, ~~include the title of the heads of all departments or divisions that perform functions~~ that can affect the quality of the repair or alteration, shall be clearly defined and documented.~~-~~ ~~and it shall show the relationship between each department or division. The manual shall identify the title of those individuals responsible for preparation, implementation, or verification of the Quality System. The responsibilities shall be clearly defined and the~~

~~individuals shall have the organizational freedom and authority to fulfill those responsibilities. The following activities shall be documented :~~

- ~~Responsibilities associated with the Authorized Inspection Agency (AIA) of record.~~
- ~~Protocol describing when the AIA of record cannot provide coverage.~~
- ~~Personnel performing supervisory activities for procedure and performance qualifications shall:~~

~~(a) be designated by the organization with responsibility for certifying qualification documents.~~

~~(b) have a satisfactory level of competence in accordance with the organization's quality program.~~

~~(c) have a record, maintained by the organization, containing objective evidence of the qualifications, training, or experience.~~

~~g~~hg) Drawings, Design and Specifications

The ~~manual~~Quality System shall contain controls to ensure that all applicable design information, ~~applicable~~ drawings, ~~design~~ calculations, specifications, and instructions are prepared or obtained, controlled, and interpreted in accordance with the scope of work and the original code of construction, including: ~~.~~

- Initiation of ~~job~~unique identifying ~~-~~numbers ~~and control of associated work~~.
- ~~Define~~Description of the ~~-~~scope of work.
- Performance and approval of design including title of approver.
- Drawings and other pertinent information (i.e., Code Edition, pressure, temperature, minimum design metal temperature, nondestructive examination (~~-NDE~~NDE), heat treatment, weld details, etc.)
- Review of design calculations, drawings, material specifications and process control sheets with Inspector to obtain acceptance.
- Revision and distribution control of design documents

~~i~~hh) Repair and Alteration Methods

~~The manual~~Quality System ~~shall include controls for repairs and alterations, including mechanical assembly procedures, materials, nondestructive examination methods, pre-heat, and postweld heat treatment, as applicable. Special requirements such as nonmetallic repairs and alterations to graphite and fiber-reinforced thermosetting plastic pressure-retaining items including bonding or mechanical assembly procedures shall be addressed, if applicable.~~The Quality System shall describe the methods for performing and documenting repairs and alterations in sufficient detail to permit the Inspector to determine at what stages specific inspections are to be performed. The method of repair or alteration must have prior acceptance of the Inspector, and when required, the jurisdiction. ~~.~~

~~j~~ii) Materials

The ~~manual~~Quality System shall describe the method used to ensure that only acceptable materials (including welding material) are used for repairs and alterations. The Quality System~~manual~~ shall include a description of how existing material is identified and new material is ordered, verified, and identified. The Quality System~~manual~~ shall identify the title of the individual(s) responsible for each function and a brief description of how the function is to be performed.

kj) Method of Performing Work

The Quality Systemmanual shall describe the methods for performing and documenting repairs and alterations in sufficient detail to permit the Inspector to determine at what stages specific inspections are to be performed. The method of repair or alteration must have prior acceptance of the Inspector. It is also essential that the Quality System include provisions to ensure safe working conditions during welding, testing, and all activities related to repairs and alterations.

jlk) Welding, NDE and Heat Treatment

The manual Quality System shall describe controls for welding, nondestructive examinationNDE, and heat treatment.

Welding –

The Quality Systemmanual is to shall indicate identify the title(s) of the individual(s) responsible for development of the welding procedure specification (WPS), and its qualification, and the qualification of welders and welding operators. It is essential that onlyOnly qualified welding procedure specificationWPS's and welders or welding operators qualifiedwillshall , as required by the NBIC, be used in the repair or alteration of pressure-retaining items. It is also essential that welders and welding operators maintain their cContinuity for welders and welding operators will be maintainedproficiency as required by the NBIC, while engaged in the repair or alteration of pressure-retaining items. The manualQuality System shall also describe controls for ensuring that the required WPS or Standard Welding Procedure Specification (SWPS) is available to the welder or welding operator prior to welding and establish the basis for welder to weld traceability.

NOTE: For qualification of welders and welding procedures to the 2019 ASME Code or later, the Quality System shall identify the title and qualifications of personnel performing supervisory activities as defined in ASME Section IX as applicable.Similar responsibility for nondestructive examination and heat treatment shall be described in the manual.

k) Nondestructive examinationNDE –

The title(s) of the individual(s) responsible to determine the type and extent of NDE required for the repair and/or alteration shall be identified. It is also essential that this manualThe Quality System shall indicateidentifys the title(s) of the individual(s) responsible for the review and acceptance of subcontracted NDE procedures and personnel. When NDE is performed in-house, the title(s) of the individual(s)l responsible for the written practice and the standard used for the basis of training, qualification, and records shall be documented.

l) Heat treatment

–The manualQuality System shall indicatedentify the title(s) of the individual(s) responsible to ensure that a proper heat treatment has been applied to the repair and/or alteration. The Quality System shall indicatedentify the title(s) of the individual(s) responsible for the review and acceptance of subcontracted heat treatment procedures and personnel. It is also essential that theThe use of alternative welding methods per the NBIC, Part 3, 2.5.3 shall be described in the Quality System.

lmkm) Examinations and Tests

The Quality SystemReference shall describe the process used to ensure that all required examinations and tests have been successfully performed and made available to the Inspector for acceptance be made in the manual for examinations and tests upon completion

of the repair or alteration, prior to signing the Form "R" Report and accepted by the Inspector.

mnln) Calibration

The Quality Systemmanual shall describe a system for the calibration of examination, measuring, and test equipment used in the performance of repairs and alterations. At a minimum, it shall include:

1) Examination, measuring, and test equipment, subject to calibration, shall have a unique identification number and a calibratedion date as well as a specified next calibration due date.

2) The methodology of how the various equipment will be calibrated.

3) The title of the person(s) responsible for the the calibration system of the equipment.

4) A statement that all calibrations will be tracible to the National Institute of Standards and Technology (NIST) or another nationally recognized Standards Organization, as much as practical.described

omon) Approval, Inspection,Authorization and Acceptance and Inspection of Repair and/or Alteration

The Quality Systemmanual shall specifically indicate state that before the work is started, acceptance authorization of the repair/alteration plan and acceptance of the method(s) used shall be obtained from an the Inspector who will make the required inspections.

and confirm NBIC compliance by signing and dating the applicable NBIC Form "R" Report Form upon completion of the work. In addition,

Tthe Quality Systemmanual shall specifically address allowance for acceptance of the inspector for application of the "R" symbol stamp to a pressure retaining item and .

The manual shall provide for adequate control of the "R" Symbol Stamp.

pnpo) Inspections and InspectionsDocument Review

The manual Quality System shall make provisions for the Inspector to have access to the physical work and all all drawings, design calculations, specifications, procedures, process sheets, repair or alteration procedures, test results, and other documents as necessary to ensure compliance with the NBIC. A copy of the current manualQuality System shall be available to the inspectorInspector.

pqoq) Control of the "R" Symbol Stamp

The Quality System shall provide adequate control of the "R" Symbol Stamp. In addition, the Quality System shall make provisions for Inspector acceptance for the application of the "R" Symbol Stamp to the pressure retaining item or nameplate.

The accepted abbreviation of the "R" Certificate Holder's name shall be included in the manual.

prpq)r) Report of Repair or Alteration Form

The Quality Systemmanual shall indicate the title of the individuals responsible for preparing, signingcertifying, and presenting the NBIC Report Forms to the Inspector. The Inspector shall confirm NBIC compliance by certifying and dating the applicable NBIC Form "R" Report upon completion of the work. The distribution of the NBIC Form "R" Report shall be described in the Quality System.

The distribution of the NBIC Form "R" Report Forms shall be described in the manual.

qs)qs) Exhibits

Any formsForms referenced in the Quality Systemmanual shall be included and. The form may be a part of the referencing document or included as an exhibit or appendix. For clarity, the forms may be completed and identified as examples. When forms are identified as examples, a statement shall clearly define the acceptable modifications to the examples without requiring Inspector acceptance.Different forms may be utilized without the need for acceptance by the Inspector as long as they contain the same information as the exhibited forms.The name and accepted abbreviations of the "R" Certificate Holder shall be included in the manual.

rtrs) Construction Code

The Quality Systemmanual shall include provisions for addressing the requirements that pertain to the specific construction codecode of construction for the equipment being repaired or altered to include any applicable code cases or interpretations. with acceptance of the jurisdiction.

sustt) Nonconformances
ing Items

AThere shall be a system shall be established to identify and control a product or service serviceprocess a nonconformance ocurrs any characteristics do not conform in adherencewhich does not conform to the applicable rules of the NBIC, code of construction code, or jurisdictional requirements, or the Quality System to prevent their use. acceptable to the Inspector for the correction of nonconformities. A nonconformance is any condition that does not comply with the applicable rules of the NBIC, construction code, jurisdictional requirements, or the quality system. In addition, theThe title(s) of the individual(s) who has responsibility and authority for the disposition and resolution disposition of of a nonconformance nonconforming itemsshall be defined including provisions for Inspector involvementNonconformance must be corrected or eliminated before the repaired or altered component can be considered in compliance with the NBIC. Handling of programmatic concerns which do not affect product or service may be addressed in the Quality System.It is also essential that systemic or programmatic nonconformances be identified and corrected and when necessary, corrected within the Quality System.

tvtuu) Records Retention

The quality manual shall describe aA system for filing, maintaining, and easily retrieving records supporting or substantiating the administration of the Quality System within the scope of the "R" *Certificate of Authorization*.

1) Records may represent any information ~~used to further substantiate the statements~~ used to provide documented evidence ~~to describe the scope~~ of the quality of items and quality control activities of the work completed to a pressure-retaining item (PRI), and documented on a Form “R” report as applicable. ~~.~~

2) Records may include, but are not limited to those depicting or calculating an acceptable design, material compliance or certifications, NDE-reports, PWHT-charts, a WPS used, a welder, bonder, or cementing technician’s process continuity records, drawings, sketches, ~~or~~ photographs, etc.

3) The record retention schedule described in the Quality System ~~Manual is to~~shall ~~-~~follow the instructions identified in NBIC Part 3, Table 1.5.1.

PROPOSED REVISION OR ADDITION

Item No.

20-83

Subject/Title

Definition of Nonconformance

NBIC Location

Part: Repairs and Alterations & Repairs and Alterations; Section: 9 & 1.5; Paragraph: Glossary & 1.5.1 s)

Project Manager and Task Group

Source (Name/Email)

Terrence Hellman / thellman@nationalboard.org

Statement of Need

Action Item 19-60 is proposing revisions/additions to all of 1.5.1. This proposal is to move the definition of "Nonconformance" out of the current 1.5.1 s) paragraph and into the glossary.

Background Information

Current text in 1.5.1 s) that is being revised via Action Item 19-60: s) Nonconforming Items There shall be a system acceptable to the Inspector for the correction of nonconformities. A nonconformance is any condition that does not comply with the applicable rules of the NBIC, construction code, jurisdictional requirements, or the quality system. Nonconformance must be corrected or eliminated before the repaired or altered component can be considered in compliance with the NBIC.

Existing Text

Proposed Text

Nonconformance – A condition of product or service in which any characteristics do not conform with the applicable rules of the NBIC, construction code, jurisdictional requirements, or the quality system.

	VOTE:						
COMMITTEE	Appr oved	Disapproved	Abs taine d	Not Voting	Passed	Faile d	Date

e) For Transport Tanks, the Competent Authority, i.e. the U.S. Department of Transportation (DOT), shallbe consulted for any requirements which it has established since they take precedence for repairs.

1) Transport tanks manufactured prior to the adoption of ASME Section XII by the Competent Authority(DOT) were constructed in accordance with ASME Section VIII, Division 1. Certain transport tanks manufactured to this code were required to be stamped in accordance with Section VIII, Division 1, if the design pressure of the transport tank was 241 kPa (35 psi) (depending on material being transported) and greater. If the design pressure was less than 241 kPa (35 psi) (depending on material being transported), the transport tank was manufactured in accordance with Section VIII,Division 1, but not required by the Competent Authority (DOT) to be stamped.

2) ASME stamped transport tanks are subject to the requirements of NBIC Part 3, for continued inservice repairs, alterations, or modifications, unless exempted by the Competent Authority (DOT).

1.3 INSPECTOR

a) Inspection and certification shall be made by an Inspector holding a valid commission with the appropriate endorsement issued by the National Board and employed by an Authorized Inspection Agency (seeNBIC Part 3, Section 9, Glossary of Terms for definition of Authorized Inspection Agency).

b) An Inspector employed by an Owner-User Inspection Organization or a Federal Inspection Agency mayauthorize and accept work only on pressure-retaining items owned or used by the respective organization. Each accredited Owner-User Inspection Organization's quality program shall have specific approval of the Jurisdiction as required.

1.3.1 AUTHORIZATION

a) The Inspector's authorization to perform a repair or alteration shall be obtained by the repair organization prior to initiation of a repair or alteration to a pressure-retaining item. The Inspector shall determine that the repair or alteration methods are acceptable.

b) Subject to acceptance of the Jurisdiction, the Inspector may give approval for routine repairs prior to thestart of work, provided the Inspector ensures that the "R" Certificate Holder has adequately addressed routine repairs in the quality program.

~~1.3.2 ACCEPTANCE INSPECTION~~ 1.3.2 INSPECTIONS AND CERTIFICATIONS

a) ~~The Inspector making the acceptance inspection~~ Inspections and NBIC Report Form certifications shall be performed by the same Inspector who authorized the repair or alteration activity. Where this is not possible or practicable, another Inspector may perform~~-~~ these ~~the~~ ~~-~~duties ~~acceptance inspection~~; however, in all cases, the Inspectors ~~who performs the acceptance inspection~~ shall be employed by the same AIA ~~an employee of the same organization~~ as the Inspector who authorized the repair or alteration activity.

b) Before signing the appropriate NBIC Report Form, the Inspector shall: ~~review the drawings, ensure the repair or alteration was performed in accordance with the accepted code of construction or standard, witness any pressure test or any acceptable alternative test method applied, ensure that the required nondestructive examinations have been performed satisfactorily, and that the other functions necessaryto ensure compliance with the requirements of this code have been satisfactorily performed.~~

1) Verify the repair or alteration activity was performed in accordance with the NBIC and accepted code of construction or standard,

2) Verify any other functions necessary to ensure compliance with the requirements of the NBIC have been satisfactorily performed,

3) Verify all applicable Inspector duties have been performed as required in NB-263 RCI-1.

4) Verify the stamping or nameplate is correct and where applicable, the nameplate has been properly attached.

~~b) The Inspector shall verify the stamping or nameplate is correct and where applicable, the nameplatehas been properly attached.~~

PART 3, SECTION 5
REPAIRS AND ALTERATIONS — CERTIFICATION/DOCUMENTATION AND STAMPING

5.1 SCOPE

This section provides requirements for certification, stamping, and documentation of repairs and alterations to pressure-retaining items. Applicable forms are provided in this section for reference. Forms may be obtained from the National Board website.

5.2 DOCUMENTATION (21)

a) Repairs that have been performed in accordance with the NBIC shall be documented on a Form R-1, *Report of Repair*, as shown in Supplement S9.2. A Form R-4, *Report Supplement Sheet*, as shown in Supplement S9.5, shall be used as needed to record additional data when the space provided on Form R-1 is not sufficient.

b) Alterations performed in accordance with the NBIC shall be documented on a Form R-2, *Report of Alteration*, as shown in Supplement S9.3. A Form R-4, *Report Supplement Sheet*, as shown in Supplement S9.5, shall be used as needed to record additional data when the space provided on Form R-2 isnot sufficient.

c) The organization performing repairs and alterations shall retain a copy of the completed Form “R” Report on file and all records and documentation substantiating the summary of work as described throughout Section 5, and as identified in the “R” Certificate Holder’s Quality System Manual.

d) Form R Reports shall be completed and certified by the Certificate Holder and the Repair Inspector no more than 90 days following the completion of the physical construction work, or following the completion of design work when no construction work is required.

5.2.1 PREPARATION OF FORM R-1 (REPORT OF REPAIR)

a) Using the instructions found in Table S9.2 of Supplement 9, preparation of Form R-1 shall be the responsibility of the “R” Certificate Holder performing the repair.

b) Information describing the scope of work used to repair a pressure-retaining item (PRI) shall be documented on a Form R-1 and extended to a Form R-4 as needed to fully describe the repair activitiescompleted per the instructions at in Table S9.2 of Supplement 9.

c) An Inspector shall indicate acceptance by signing Form R-1, and Form R-4, if attached.

d) The Form R-3, *Report of Parts Fabricated by Welding,* Manufacturer’s Data Reports, and Certificates of Compliance described in this section shall be a part of the completed Form R-1 and shall be attached thereto. (21)

5.2.2 PREPARATION OF FORM R-2 (REPORT OF ALTERATION)

a) Using the instructions found in Table S9.3 of Supplement 9, initial preparation of Form R-2 shall be the responsibility of the “R” Certificate Holder responsible for the design portion of the alteration. The design organization shall complete and sign the “Design Certification” section of the Form R-2. An Inspector shall indicate acceptance of the design by signing the “Certificate of Design Change Review” section of the Form R-2.

b) The information describing an alteration to a pressure-retaining item shall be identified on Form R-2 with a complete description of the scope of work for physical or non-physical changes. When the scope of work represents a change that will increase the Minimum Required Relieving Capacity (MRRC) of a pressure-retaining item, such as a change in heating surface, Maximum Designed Steaming Capacity

5.4 DISTRIBUTION OF FORM R-2

a) Distribution of completed Form R-2 shall be the responsibility of the “R” Certificate Holder who performed the construction portion of the alteration. When no construction work is performed (e.g., a re-rating with no physical changes), the “R” Certificate Holder responsible for the design shall distribute the form.

b) Legible copies of the completed Form R-2, together with attachments, shall be distributed to the owner-user, the “R” Certificate Holder responsible for design, and the Jurisdiction, if required, and shall be provided to the Inspector and inservice Authorized Inspection Agency of the pressure retaining item upon request.

5.5 REGISTRATION OF FORMS — GENERAL

a) When registration of the forms are required, the Certificate Holder performing a repair or alteration shall submit the completed form, meeting the requirements of the NBIC, to the National Board no more than 30 days following certification.

b) When registration of the forms is not required, the Certificate Holder may register the completed form, meeting the requirements of the NBIC, with the National Board.

c) The “R” or “NR” Certificate Holder should be aware that some Jurisdictions may require registration of repairs and alterations with the National Board.

5.5.1 REGISTRATION FOR REPAIRS

Form R-1 may be registered with the National Board as noted in NBIC Part 3, 5.5.

5.5.2 REGISTRATION FOR ALTERATIONS

a) If the pressure-retaining item is originally registered with the National Board, an original Form R-2, together with attachments, shall be registered with the National Board.

b) If the item was not registered with the National Board, one original Form R-2, together with attachments, may be registered with the National Board or retained as required by the Quality System Manual.

5.5.3 REGISTRATION FOR FIBER-REINFORCED VESSELS

Organizations performing repairs or alterations under an “R” stamp program shall register such repairs or alterations with the National Board.

5.5.4 REGISTRATION FOR NUCLEAR REPAIR/REPLACEMENT ACTIVITIES

Organizations performing repair/replacement activities under the “NR” or “NVR” stamp program shall register forms with the National Board.

5.5.5 REGISTRATION FOR GRAPHITE VESSELS

Organizations performing repair/replacement activities under the “R” stamp program shall register such repairs or alterations with the National Board.

Existing words

4.2 NONDESTRUCTIVE EXAMINATION

a) The nondestructive examination (NDE) requirements, including technique, extent of coverage, procedures, personnel qualification, and acceptance criteria, shall be in accordance with the original code of construction for the pressure-retaining item. Weld repairs and alterations shall be subjected to the same nondestructive examination requirements as the original welds. Where this is not possible or practicable, alternative NDE methods acceptable to the Inspector and the Jurisdiction where the pressure-retaining item is installed, where required, may be used.

1) For welds that were subject to volumetric NDE during construction, repairs may be examined by MT or PT in lieu of volumetric examination under all of the following conditions:
    a) The repair depth does not exceed the lesser of 1/8 inch (3 mm) or 25% of the nominal base material thickness;
    b) The aggregate repair length is no longer than the lesser of 6 inches (150 mm) or 10% of the total joint length; and
    c) The base material and each layer of deposited weld shall be examined with MT or PT.

PROPOSED REVISION OR ADDITION

Item No. 21-33

Subject/Title: Use of code cases pertaining to repairs and alterations

NBIC Location Part: Repairs and Alterations; Section: 1; Paragraph: 1.2(~~f~~a)

Project Manager and Task Group: Robert Underwood, Subcommittee Repairs/Alterations

Source (Name/Email): Robert Underwood / robert_underwood@hsb.com

Statement of Need: The NBIC Part 3 already references code cases in various paragraphs such as NR quality requirements, welding method 7, and R Form instructions, but there is no direct reference to acceptance of their use. I think it's always been an unwritten rule that they are permitted to be used with acceptance of the Inspector and Jurisdiction. This proposal will address this in a new paragraph 1.2(~~f~~a).

Background Information: Section IX approved Code Case 3002 which addresses qualification of WPS and WPQ relating to the Explosion Welding Process for Tube Plugging. This Code Case was specifically written for NBIC use. This proposal will clarify that use of code cases are permitted with Inspector and Jurisdiction approval, when required.

Existing Text :

Proposed Text:

1.2(~~f~~a) When the standard governing the original code of construction is the ASME Code or ASME RTP-1, repairs and alterations to pressure-retaining items shall conform, insofar as possible, to the section and edition of the ASME Code most applicable to the work planned. Use of active ASME Code Cases pertaining to the repair and alteration of pressure retaining items are subject to review and acceptance of the Inspector, and when required, the Jurisdiction. Use of the ASME Code Case shall be noted on the appropriate Form R Report.

PROPOSED REVISION OR ADDITION

Item No.

A 21-35

Subject/Title

Part 3, Table S1.1.3.1, Threaded Staybolts and Patch Bolts is incorrect

NBIC Location

Part: Repairs and Alterations; Section: S1; Paragraph: S!.1.3.1

Project Manager and Task Group

Source (Name/Email)

Linn Moedinger / linnwm@supernet.com

Statement of Need

The wording in the 2017 NBIC was "Threaded Staybolts and Patch Bolts SA-31 Grade A SA-675 with a tensile strength of 47,000 psi to 65,000 psi inclusive" A change was made for the 2019 Edition to reflect the grades rather than tensile strength. Somehow the wrong grades were used and this was not caught until now.

Background Information

ASME adopted SA-675 grades 45, 50, and 55 rather than using the tensile strengths of the material. Using the grades allows for material from 45ksi to 65ksi. The limitation of 7500 psi stay stress on locomotive boilers allows for 45ksi to be used with a design margin of 6.

Existing Text	**Proposed Text**
Threaded Staybolts and Patch Bolts SA-31 Grade A, SA-675 grade 60, 65, 70	Threaded Staybolts and Patch Bolts SA-31 Grade A, SA-675 grade ~~60, 65, 70~~45, 50, 55

PROPOSED REVISION OR ADDITION

Item No.

A 21-43

Subject/Title

Defining and revising "Practicable" and "Practical" within the NBIC

NBIC Location

Part: Repairs and Alterations; Section: 9; Paragraph: Glossary - All Parts

Project Manager and Task Group

Marty Toth, Subcommittee Repairs/Alterations

Source (Name/Email)

Marty Toth / mtoth@boiscotraininggroup.com

Statement of Need

Defining and revising Practicable and Practical within the NBIC and revising where applicable

Background Information

Defining and revising Practicable and Practical within the NBIC and revising where applicable

Existing Text	Proposed Text
	TBD

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

PROPOSED REVISION OR ADDITION

Item No.

A 21-44

Subject/Title

Defining "De-Rating" within Part 3

NBIC Location

Part: Repairs and Alterations; Section: Section 3; Paragraph: 3.4.1

Project Manager and Task Group

Marty Toth, Subcommittee Repairs/Alterations

Source (Name/Email)

Marty Toth / mtoth@boiscotraininggroup.com

Statement of Need

Defining de-rating within Part 3

Background Information

Defining de-rating within Part 3

Existing Text	Proposed Text
	TBD

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

Item NB21-45, add "SUPPLEMENT XX - REPAIR METHODS OF PRESSURE VESSELS AND PIPING EXCLUSIVE TO OIL, GAS, AND CHEMICAL INDUSTRIES"

SXX.1 SCOPE

This supplement provides methods for repair of pressure vessels and piping, outside the boiler setting, exclusive to oil, gas, and chemical industries.

SXX.2 CONSTRUCTION STANDARDS

Repairs shall conform, insofar as possible, to the relevant requirements of the edition of the code of construction. Where this is not practicable, it is permissible to use other codes, standards, or specifications, provided the "R" Certificate Holder has the concurrence of the Inspector and the jurisdiction, where required.

SXX.3 LIMITATIONS

Repairs will be limited to pressure retaining items which comply with the following conditions:

a) Operates at or below 650°F (345°C) for carbon steels or below the time dependent service temperatures for low alloy steel.

b) Impact testing was not required.

c) No environmental or service-related cracking conditions exist. Service-related cracks may remain in the item when a Fitness for Service Assessment (FFSA) in accordance with NBIC, Part 2, 4.4.1, has been performed supporting the continued service of the item.

SXX.4 JURISDICTIONAL REQUIREMENTS

Repairs will require notification to the jurisdiction and where required, jurisdictional approval prior to performing work.

SXX.5 REPAIR METHODS

a) WELDED LAP PATCH

A fillet welded patch is a repair method used to maintain the structural integrity of the pressure retaining item by providing an external boundary over the area exhibiting damage in the form of a "fillet welded patch" as described by ASME PCC-2, Full Encirclement Steel Reinforcing Sleeves for Piping, Fillet Welded Lap Patches with Reinforcing Plug Welds, or Fillet Welded Lap Patches.

1) Welded lap patches shall be further restricted as follows:

a. A lap patches installed over an existing lap patch is prohibited.

b. The distance between patches shall not be less than $2\sqrt{(Rt)}$.

2) Except as required in Part 3, Paragraph SXX.5 a)4)a), ASME PCC-2 shall be used for the design of the fillet welded patch and shall be in accordance with the original code of construction, when practicable. Design of the fillet welded patch shall consider original design conditions, taking in to account current service conditions and damage mechanisms. Use of this method shall be acceptable to the inspector and when required, the jurisdiction and shall be limited to pressure containing equipment owned and operated by an Owner-User.

a. Replacement of a pressure-retaining part with a material of different nominal composition and, equal to or greater in allowable stress from that used in the original design, provided the replacement material satisfies the material and design requirements of the original code of construction under which the vessel was built. The minimum required thickness shall be at least equal to the thickness stated on the original Manufacturer's Data Report.

3) The "R" Certificate Holder responsible for the design of the fillet welded patch shall ensure a Fitness for Service Assessment (FFSA) has been performed on the

portion of the item being patched in accordance with NBIC, Part 2, 4.4.1, supporting the continued service of the item. The fillet welded patch repair method shall not remain in place beyond the calculated remaining life of the covered portion of the pressure retaining item.

a) The remaining life of the pressure retaining item shall be documented on the Report of FFSA in the Remarks section. The Report of FFSA Form shall be affixed to the Form R-1 and identified in the Remarks section.

b) The thinned or leaking area shall be fully covered, as specified in the FFSA, to the distance where the minimum required metal thickness is verified. Wall thickness shall be verified in the area to be welded.

c) A fillet welded patch method shall not be used where cracks are present unless the cracks have been removed and repaired in accordance with Part 3, 3.3.4.2 a); the condition that led to the crack formation and propagation have been eliminated.

4) Hazards associated with welding on degraded components should be addressed with the Owner-User by the use of engineering controls, administrative controls and personal protective equipment.

a) When the pressure retaining item will remain in service while implementing a fillet welded patch, the requirements and limitations described within ASME PCC-2, Part-1 shall be used in conjunction with ASME PCC-2, Part-2, Full Encirclement Steel Reinforcing Sleeves for Piping, Fillet Welded Lap Patches with Reinforcing Plug Welds, or Fillet Welded Lap Patches as applicable.

b) API RP-2201, “Safe Hot Tapping Practices in the Petroleum and Petrochemical Industries” may be used as a guideline for identifying hazards associated with welding to a component that is under pressure, including service restrictions.

5) Test or examination methods shall be in accordance with NBIC, Part 3, 4.4.1.

a) Visual examination shall be in accordance with the NBIC, Part 3, 4.4.1 e).

SXX.6 Post Repair Inspection

a) After the completion of weld repairs, post repair inspection requirements shall be established in accordance with Part 3, 3.3.4.8.

SXX.7 Documentation

a) Completion of the Form R-1 shall follow the requirements for preparation, distribution, and registration as described in Part 3, Section 5.

Additional actions required by accepting this item:

Revise the succeeding paragraph numbering order (ref.2021-edition) to:

3.3.3 EXAMPLES OF REPAIRS

v) The installation of a fillet welded patch.

PROPOSED REVISION OR ADDITION

Item No.

A 21-53

Subject/Title

Post Repair Inspection of weld repairs to CSEF steels

NBIC Location

Part: Repairs and Alterations; Section: S8.5; Paragraph: a)

Project Manager and Task Group

Source (Name/Email)

Mark Kincs / mark.r.kincs@xcelenergy.com

Statement of Need

The requirement for Inspector involvement in post-repair inspections to CSEF weld repairs is to ensure future safe operation of the boiler. This is a function of the inservice Authorized Inspection Agency, not the Repair Inspector, whose duties end with completion of repair documentation.

Background Information

The post-repair inspection requirements specified in S8.5 are unique. There is no other mention of such inspections elsewhere in NBIC–Part 3. Presumably, Welding Method 6 repairs don't require post-repair inspection due to the perceived low-level of associated risk (inside the boiler setting).

Existing Text	**Proposed Text**
After the completion of weld repairs to CSEF steels, post inspection requirements shall be developed and implemented based on acceptance from the Inspector, and if applicable, the Jurisdiction.	After the completion of weld repairs to CSEF steels, post inspection requirements shall be developed and implemented based on acceptance from the inservice Authorized Inspection Agency of the pressure retaining item ~~Inspector~~, and if applicable, the Jurisdiction.

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

PROPOSED REVISION OR ADDITION

Item No.

A 21-67

Subject/Title

Add welding requirements to plugging firetubes

NBIC Location

Part: Repairs and Alterations; Section: 3; Paragraph: 3.4.9

Project Manager and Task Group

Source (Name/Email)

Kathy Moore / kathymoore@joemoorecompany.com

Statement of Need

The current NBIC does not have enough direction or requirements for welding tube plugs in fitretubes

Background Information

Improper welding of tube plugs in firetubes often creates ligament cracks.

Existing Text	Proposed Text
	Needs to be created

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

S9.2 FORM R-1, REPORT OF REPAIR, NB-66

FIGURE S9.2.1
FORM R-1, PAGE 1 OF 2

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NB-66, Rev. 16, (02/04/21)

FORM R-1 REPORT OF REPAIR
in accordance with provisions of the *National Board Inspection Code*

(1) (Authorized Rep. initials)
(2) (Inspectors initials)
(3) (Form "R" Registration no.)
(4) (P.O. no., job no., etc.)

1. WORK PERFORMED BY: (5) (name of repair organization)
(address)
2. OWNER: (6) (name)
(address)
3. LOCATION OF INSTALLATION: (7) (name)
(address)
4. ITEM IDENTIFICATION: (8) (boiler, pressure vessel, or piping) NAME OF ORIGINAL MANUFACTURER: (9)
5. IDENTIFYING NOS: (10) (mfg. serial no.) (11) (National Board no.) (12) (jurisdiction no.) (13) (other) (14) (year built)
6. NBIC EDITION/ADDENDA: (15) (edition) (addenda)
Original Code of Construction for Item: (16) (name / section / division) (edition / addenda)
Construction Code Used for Repair Performed: (17) (name / section / division) (edition / addenda)
7. REPAIR TYPE: (18) ☐ welded ☐ graphite pressure equipment ☐ FRP pressure equipment ☐ DOT
8. DESCRIPTION OF WORK: (use Form R-4, if necessary) ☐ Form R-4, Report Supplement Sheet is attached ☐ FFSA Form (NB-403) is attached
(19)
(20) (Liquid, Pneumatic, Vacuum, Leak) Pressure Test, if applied (21) psi MAWP (22) psi
9. REPLACEMENT PARTS: (Attached are Manufacturer's Partial Data Reports or Form R-3's properly completed for the following items of this report):
(name of part, item number, data report type or Certificate of Compliance, mfg's. name and identifying stamp)
(23)
10. REMARKS: (24)

This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors • 1055 Crupper Avenue, Columbus, Ohio 43229-1183 Page 1 of 2

SUPPL. 9

FIGURE S9.2.2
FORM R-1, PAGE 2 OF 2

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NB-66, Rev. 16, (02/04/21)

(25) _____
(Form "**R**" Registration no.)

(26) _____
(P.O. no., job no., etc.)

CERTIFICATE OF COMPLIANCE

I, (27) _____, certify that to the best of my knowledge and belief the statements made in this report are correct and that all material, construction, and workmanship on this Repair conforms to the *National Board Inspection Code*. National Board "**R**" *Certificate of Authorization* No. (28) _____ Expiration date: (29) _____

Repair Organization: (30) _____

Signed: (31) _____
(authorized representative)

Date: (32) _____

CERTIFICATE OF INSPECTION

I, (33) _____, holding a valid commission issued by The National Board of Boiler and Pressure Vessel Inspectors and certificate of competency, where required, issued by the Jurisdiction of (34) _____ and employed by (35) _____ of (36) _____ have inspected the work described in this report on ~~(37)~~ _____, and state that to the best of my knowledge and belief, this work complies with the applicable requirements of the *National Board Inspection Code*. By signing this certificate, neither the undersigned nor my employer makes any warranty, expressed or implied, concerning the work described in this report. Furthermore, neither the undersigned nor my employer shall be liable in any manner for any personal injury, property damage, or loss of any kind arising from or connected with this inspection.

Commissions: ~~(38)~~ 37
(National Board and Jurisdiction no. including endorsement)

Signed: ~~(39)~~ 38
(Inspector)

Date: ~~(40)~~ 39

This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors • 1055 Crupper Avenue, Columbus, Ohio 43229-1183 Page 2 of 2

TABLE S9.2
GUIDE FOR COMPLETING FORM R-1, REPORT OF REPAIR, NB-66

Reference to Circled Numbers in the Form	Description
(1)	Initials of the authorized representative of the "R" Certificate Holder.
(2)	Initials of the Inspector reviewing the "R" Certificate Holders work.
(3)	When registering a Form R-1 Report with the National Board, this line is solely designated for a unique sequential number assigned by the "R" Certificate Holder. When the "R" Form is not to be registered, indicate so by "N/A". As described in NBIC Part 3, 5.6, a log shall be maintained identifying sequentially, any Form "R" registered with the National Board.
(4)	If applicable, document the unique purchase order, job, or tracking number assigned by the organization performing the work.
(5)	The name and address of the National Board "R" Certificate Holder performing the work as it appears on the "*Certificate of Authorization*".
(6)	Name and address of the owner of the pressure-retaining item.
(7)	Name and address of plant or facility where the pressure-retaining item is installed.
(8)	Description of the pressure-retaining item, such as boiler or pressure vessel, or piping. Include the applicable unit identification.
(9)	Name of the original manufacturer of the pressure-retaining item. If the original manufacturer is unknown, indicate by, "unknown."
(10)	Document the serial number of the pressure-retaining item if assigned by the original manufacturer. If there is no serial number assigned or is unknown, indicate "unknown."
(11)	When the pressure-retaining item is registered with the National Board, document the applicable registration number. If the pressure-retaining item is installed in Canada, indicate the Canadian design registration number (CRN), and list the drawing number under "other." If the item is not registered, indicate, "none."
(12)	Indicate the jurisdiction number assigned to the pressure retaining item, if available.
(13)	Indicate any other unique identifying nomenclature assigned to the pressure retaining item by the owner or user.
(14)	Identify the year in which fabrication/construction of the pressure retaining item was completed.
(15)	Indicate edition and addenda of the NBIC under which this work is being performed.
(16)	Indicate the name, section, division, edition, and addenda (if applicable) of the original code of construction for the pressure-retaining item.

TABLE S9.2 CONT'D

Reference to Circled Numbers in the Form	Description
(17)	Indicate the name, section, division, edition, and addenda (if applicable) of the construction code used for the work being performed. If code cases are used, they shall be identified in the "Remarks" section.
(18)	Check the repair type performed on the pressure retaining item.
(19)	Provide a detailed summary describing the scope of work that was completed to a pressure retaining item (PRI). The information to be considered when describing the scope of work should include such items as, the nature of the repair (i.e. welding, bonding, cementing), the specific location of the work performed to the PRI, the steps taken to remove a defect or as allowed by 3.3.4.8 to remain in place, the method of repair described as listed in the examples of Part 3, Section 3 or supplemental section if applicable, and the acceptance testing and or examination method used in accordance with the NBIC. When additional space is required to describe the scope of work, a Form R-4 shall be used and attached (check box). If a FITNESS FOR SERVICE Form (NB-403) is part of the Form R-1 repair package, check box and attach the form. Information determined to be of a proprietary nature need not be included, but shall be stated on the form.
(20)	Indicate type of pressure test applied (Liquid, Pneumatic, Vacuum, Leak). If no pressure test applied, indicate "none."
(21)	Indicate test pressure applied.
(22)	Indicate maximum allowable working pressure (MAWP) for the pressure retaining item, if known.
(23)	As applicable, identify what Replacement Parts manufactured by welding or bonding were introduced as needed to complete the scope of work. Indicate part, item number, manufacturer's name, stamped identification, and data report type or Certificate of Compliance.
(24)	Indicate any additional information pertaining to the work involved (e.g., routine repairs, code cases).
(25)	When registering a Form R-1 Report with the National Board, this line is solely designated for a unique sequential number assigned by the "R" Certificate Holder. When the "R" Form is not to be registered, indicate so by "N/A". As described in NBIC Part 3, 5.6, a log shall be maintained identifying sequentially, any Form "R" registered with the National Board.
(26)	If applicable, document the unique purchase order, job, or tracking number assigned by organization performing work.
(27)	Type or print name of authorized representative of the "R" Certificate Holder attesting to accuracy of the work described.
(28)	Indicate National Board "R" *Certificate of Authorization* number.
(29)	Indicate month, day, and year that the "R" *Certificate of Authorization* expires.

TABLE S9.2 CONT'D

Reference to Circled Numbers in the Form	Description
(30)	Record name of "R" Certificate Holder who performed the described work, using full name as shown on the *Certificate of Authorization* or an abbreviation acceptable to the National Board.
(31)	Signature of "R" Certificate Holder authorized representative.
(32)	Enter month, day, and year repair certified.
(33)	Type or print name of Inspector.
(34)	Indicate Inspector's Jurisdiction.
(35)	Indicate Inspector's employer.
(36)	Indicate address of Inspector's employer (city and state or province).
~~(37)~~	~~Indicate month, day, and year of final inspection by Inspector. For routine repairs this shall be the month, day, and year the Inspector reviews the completed routine repair package~~.
~~(38)~~ 37	Inspector's National Board commission number and endorsement that qualifies the Inspector to sign this report, and when required by the Jurisdiction, the applicable State or Provincial numbers.
~~(38)~~ 38	Signature of Inspector.
~~(40)~~ 39	Indicate month, day, and year of Inspector signature

SUPPL. 9

S9.3 FORM R-2, REPORT OF ALTERATION, NB-229

FIGURE S9.3.1
FORM R-2, PAGE 1 OF 2

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NB-229, Rev. 8, (03/04/21)

FORM R-2 REPORT OF ALTERATION
in accordance with provisions of the *National Board Inspection Code*

(1) (Authorized Rep. initials)
(2) (Inspectors initials)
(3) (Form "R" Registration no.)
(4) (P.O. no., job no., etc.)

1a. DESIGN PERFORMED BY: (5) (name of "R" organization responsible for design)
(address)

1b. CONSTRUCTION PERFORMED BY: (6) (name of "R" organization responsible for construction)
(address)

2. OWNER OF PRESSURE RETAINING ITEM: (7) (name)
(address)

3. LOCATION OF INSTALLATION: (8) (name)
(address)

4. ITEM IDENTIFICATION: (9) (boiler, pressure vessel, or piping) NAME OF ORIGINAL MANUFACTURER: (10)

5. IDENTIFYING NOS: (11) (mfg. serial no.) (12) (National Board no.) (13) (jurisdiction no.) (14) (other) (15) (year built)

6. NBIC EDITION/ADDENDA: (16) (edition) (16) (addenda)

Original Code of Construction for Item: (17) (name / section / division) (17) (edition / addenda)

Construction Code Used for Alteration Performed: (18) (name / section / division) (18) (edition / addenda)

7a. DESCRIPTION OF DESIGN SCOPE: ☐ Form R-4, Report Supplement Sheet is attached
(19)

7b. DESCRIPTION OF CONSTRUCTION SCOPE: ☐ Form R-4, Report Supplement Sheet is attached
(20)

(21) Pressure Test, if applied (22) psi MAWP (23) psi

This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors • 1055 Crupper Avenue, Columbus, Ohio 43229-1183 Page 1 of 2

FIGURE S9.3.2
FORM R-2, PAGE 2 OF 2

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NB-229, Rev. 8, (03/04/21)

(24) (Form "R" Registration no.)

(25) (P.O. no., job no., etc.)

8. REPLACEMENT PARTS: (Attached are Manufacturer's Partial Data Reports or Form R-3's properly completed for the following items of this report):

(name of part, item number, data report type or Certificate of Compliance, mfg's. name and identifying stamp)

(26)

9. REMARKS: (27)

DESIGN CERTIFICATION

I, (28), certify that to the best of my knowledge and belief the statements in this report are correct and that the Design Change described in this report conforms to the *National Board Inspection Code*. National Board "**R**" Certificate of Authorization No. (29) expires on (30)

Date (31), (32) (name of design organization) Signed (33) (authorized representative)

CERTIFICATE OF DESIGN CHANGE REVIEW

I, (34), holding a valid Commission issued by The National Board of Boiler and Pressure Vessel Inspector and certificate of competency, where required, issued by the jurisdiction of (35) and employed by (36) of (37) have reviewed the design change as described in this report and state that to the best of my knowledge and belief such change complies with the applicable requirements of the *National Board Inspection Code*.

By signing this certificate, neither the undersigned nor my employer makes any warranty, expressed or implied, concerning the work described in this report. Furthermore, neither the undersigned nor my employer shall be liable in any manner for any personal injury, property damage or loss of any kind arising from or connected with this inspection.

Date (38) Signed (39) (inspector) Commissions (40) (National Board and jurisdiction no. including endorsement)

CONSTRUCTION CERTIFICATION

I, (41), certify that to the best of my knowledge and belief the statements in this report are correct and that all material, construction, and workmanship on this Alteration conforms to the National Board Inspection Code. National Board "**R**" Certificate of Authorization No. (42) expires on (43)

Date (44), (45) (name of alteration organization) Signed (46) (authorized representative)

CERTIFICATE OF INSPECTION

I, (47), holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and certificate of competency, where required, issued by the Jurisdiction of (48) and employed by (49) of (50) have inspected the work described in this report on (51), and state that to the best of my knowledge and belief, this work complies with the applicable requirements of the National Board Inspection Code. By signing this certificate, neither the undersigned nor my employer makes any warranty, expressed or implied, concerning the work described in this report. Furthermore, neither the undersigned nor my employer shall be liable in any manner for any personal injury, property damage, or loss of any kind arising from or connected with this inspection.

Date (52) 51 Signed (53) ~~51~~ 52 (inspector) (54) ~~53~~ 53 (National Board and jurisdiction no. including endorsement)

This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors • 1055 Crupper Avenue, Columbus, Ohio 43229-1183 Page 2 of 2

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TABLE S9.3
GUIDE FOR COMPLETING FORM R-2, REPORT OF ALTERATION, NB-226

Reference to Circled Numbers in the Form	Description
(1)	Initials of the National Board "R" Certificate of Authorization authorized representative who registers the Form R-2.
(2)	Initials of the Inspector who certified the completed Form R-2 for registration.
(3)	When registering a Form R-2 with the National Board, this line is solely designated for a unique sequential number assigned by the "R" Certificate Holder. As described in NBIC Part 3, Paragraph 5.6, a log shall be maintained identifying unique and sequentially numbered Form "R" reports that are registered with the National Board. For rerating only, the Design Organization registers the Form R-2.
(4)	If applicable, document the unique purchase order, job, or tracking number assigned by the organization performing the work.
(5)	The name and address of the National Board "R" *Certificate of Authorization* holder performing the design as it appears on the "*Certificate of Authorization*".
(6)	The name and address of the National Board "R" Certificate of Authorization holder performing the construction activity as it appears on the "Certificate of Authorization."
(7)	Name and address of the owner of the pressure-retaining item.
(8)	Name and address of the plant or facility where the pressure-retaining item is installed.
(9)	Description of the pressure-retaining item, such as boiler or pressure vessel, or piping. Include the applicable unit identification.
(10)	Name of the original manufacturer of the pressure-retaining item. If the original manufacturer is unknown, indicate by, "unknown."
((11)	Document the serial number of the pressure-retaining item if assigned by the original manufacturer. If there is no serial number assigned or it is unknown, indicate "unknown."
(12)	When the pressure-retaining item is registered with the National Board, document the applicable registration number. If the pressure-retaining item is installed in Canada, indicate the Canadian design, registration number (CRN), and list the drawing number under "other." If the item is not registered, indicate, "none."
(13)	Indicate the jurisdiction number assigned to the pressure retaining item, if available.
(14)	Indicate any other unique identifying nomenclature assigned to the pressure retaining item by the owner or user.
(15)	Identify the year in which fabrication/construction of the pressure retaining item was completed.

TABLE S9.3 CONT'D

Reference to Circled Numbers in the Form	Description
(16)	Indicate edition and addenda of the NBIC under which this work is being performed, as applicable.
(17)	Indicate the name, section, division, edition, and addenda (if applicable) of the original code of construction for the pressure-retaining item.
(18)	Indicate the name, section, division, edition, and addenda (if applicable) of the construction code used for the work being performed. If code cases are used, they shall be identified in the "Remarks" section.
(19)	Provide a detailed summary of the scope of design that was performed. When additional space is required to describe the design scope, a Form R-4 shall be used and attached (check box if needed).
(20)	The information to be considered when describing the construction scope of work should include such items as, the nature of the alteration (i.e. welding, bonding, cementing), the specific location of the work performed to the pressure retaining item, the steps taken to remove a defect or as allowed by NBIC Part 3, Paragraph 3.3.4.8 to remain in place, and the method of alteration described as listed in the examples of NBIC Part 3, Paragraph 3.4.4 or applicable supplement. When additional space is required to describe the construction scope, a Form R-4 shall be used and attached (check box if needed).
(21)	Indicate type of pressure test applied (liquid, pneumatic, vacuum, leak). If no pressure test applied, indicate "none."
(22)	Indicate test pressure applied.
(23)	Indicate maximum allowable working pressure (MAWP) for the pressure retaining item. (As altered)
(24)	When registering a Form R-2 with the National Board, this line is solely designated for a unique sequential number assigned by the "R" Certificate Holder. As described in NBIC Part 3, Paragraph 5.6, a log shall be maintained identifying unique and sequentially numbered Form "R" reports that are registered with the National Board. For rerating only, the Design Organization registers the Form R-2.
(25)	If applicable, document the unique purchase order, job, or tracking number assigned by organization performing work.
(26)	As applicable, identify what parts manufactured by welding or bonding were introduced as needed to complete the scope of work. Indicate part, item number, manufacturer's name, stamped identification, and data report type or Certificate of Compliance.
(27)	Indicate any additional information pertaining to the work involved (e.g. code cases, interpretations used).
(28)	Type or print name of the National Board "R" *Certificate of Authorization* authorized representative responsible for design certification.

TABLE S9.3 CONT'D

Reference to Circled Numbers in the Form	Description
(29)	Indicate National Board "R" *Certificate of Authorization* number.
(30)	Indicate month, day, and year that the "R" *Certificate of Authorization* expires.
(31)	Indicate month, day, and year the alteration was certified.
(32)	Record the name of National Board "R" *Certificate of Authorization* holder who performed the design portion of the work, using full name as shown on the "*Certificate of Authorization*" or an abbreviation acceptable to the National Board.
(33)	Signature of National Board "R" *Certificate of Authorization* authorized representative for the design change.
(34)	Type or print the name of Inspector certifying the design review.
(35)	Indicate Inspector's Jurisdiction.
(36)	Indicate Inspector's employer.
(37)	Indicate address of Inspector's employer (city and state or province).
(38)	Indicate the month, day and year of the design certification by the Inspector.
(39)	Signature of the Inspector certifying the design review.
(40)	Inspectors National Board commission number and endorsement that qualifies the Inspector to sign this report, and when required by the Jurisdiction, the applicable State or Provincial numbers.
(41)	Type or print name of the National Board "R" *Certificate of Authorization* authorized representative responsible for any construction.
(42)	Indicate the National Board "R" *Certificate of Authorization* number.
(43)	Indicate month, day, and year the National Board "R" *Certificate of Authorization* expires.
(44)	Indicate the date the alteration was certified.
(45)	Record the name of National Board "R" *Certificate of Authorization* holder who performed the construction portion of the described work, using full name as shown on the *Certificate of Authorization* or an abbreviation acceptable to the National Board.
(46)	Signature of National Board "R" *Certificate of Authorization* authorized representative.
(47)	Type or print the name of Inspector certifying the construction inspection.
(48)	Indicate the Inspector's Jurisdiction.
(49)	Indicate Inspector's employer.
(50)	Indicate address of Inspector's employer (city and state or province).

TABLE S9.3 CONT'D

Reference to Circled Numbers in the Form	Description
~~(51)~~	~~Indicate the month, day and year of the final inspection by the Inspector.~~
~~(52)~~ 51	Indicate the month, day and year the completed Form R-2 was signed by the Inspector.
~~(53)~~ 52	Signature of the Inspector certifying the construction inspection.
~~(54)~~ 53	Inspector's National Board commission number and endorsement that qualifies the Inspector to sign this report, and when required by the Jurisdiction, the applicable State or Provincial numbers.

S9.4 FORM R-3, REPORT OF PARTS FABRICATED BY WELDING, NB-230

FIGURE S9.4.1
FORM R-3, PAGE 1 OF 2

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NB-230, Rev. 4 (12/08/16)

FORM R-3 REPORT OF PARTS FABRICATED BY WELDING
in accordance with provisions of the *National Board Inspection Code*

(1) (Authorized Rep. initials)
(2) (Inspectors initials)
(3) (Form "R-3" Registration no.)
(5) (P.O. no., job no., etc.)

1. MANUFACTURED BY: (4) (name of "R" certificate holder)
(address)
2. MANUFACTURED FOR: (6) (name)
(address)
3. DESIGN CONDITION SPECIFIED BY: (7) CODE DESIGN BY: (8)
4. DESIGN CODE: (9) (10) (11) (12)
5. REPAIR/ALTERATION/MODIFICATION ACTIVITIES

Name of Part	Qty.	Line No.	Manufacturer's Identifying No.	Manufacturer's Drawing No.	MAWP	Shop Hydro PSI	Year Built
(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)

6. DESCRIPTION OF PARTS

	(a) Connections other than tubes			Heads or Ends			(b) Tubes		
Line No.	Size and Shape	Material Spec. No.	Thickness (in.)	Shape	Thickness (in.)	Material Spec. No.	Diameter (in.)	Thickness (in.)	Material Spec. No.
(15)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)

7. REMARKS: (30)

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FIGURE S9.4.2
FORM R-3, PAGE 2 OF 2

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NB-230, Rev. 4 (12/08/16)

(31) _____
(Form "R-3" Registration no.)

(32) _____
(P.O. no., job no., etc.)

CERTIFICATE OF COMPLIANCE

I, (33) _____, certify that to the best of my knowledge and belief the statements made in this report are correct and that all material, fabrication, construction, and workmanship of the described parts conforms to the *National Board Inspection Code* and the standards of construction cited.

National Board "**R**" *Certificate of Authorization* No. (34) _____ expires on: (35) _____, _____

Date (36) _____, _____ (37) _____ Signed (38) _____

(name of "R" Certificate holder) (Authorized Representative)

CERTIFICATE OF INSPECTION

I, (39) _____, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and certificate of competency, where required, issued by the Jurisdiction of (40) _____ and employed by (41) _____ of (42) _____ have inspected the part described in this report on (43) _____, _____ and state that to the best of my knowledge and belief the parts comply with the applicable requirements of the *National Board Inspection Code*.

By signing this certificate, neither the undersigned nor my employer makes any warranty, expressed or implied, concerning the work described in this report. Furthermore, neither the undersigned nor my employer shall be liable in any manner for any personal injury, property damage, or loss of any kind arising from or connected with this inspection.

Date (44) 43, _____ Signed (45) 44 Commissions (46) 45

(inspector) (National Board and jurisdiction No. including endorsement)

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SUPPL. 9

TABLE S9.4

GUIDE FOR COMPLETING FORM R-3, REPORT OF PARTS FABRICATED BY WELDING, NB-230

Reference to Circled Numbers in the Form	Description
(1)	Initials of the National Board "R" *Certificate of Authorization* authorized representative who registers the Form R-3.
(2)	Initials of the Inspector who certified the completed Form R-3 for registration.
(3)	When registering a Form R-3 Report with the National Board, this line is solely designated for a unique sequential number assigned by the "R" Certificate Holder. When the "R" Form is not to be registered, indicated so by "N/A". As described in NBIC Part 3, Paragraph 5.6, a log shall be maintained identifying unique and sequentially numbered Form "R" reports that are registered with the National Board.
(4)	The name and address of the National Board "R" Certificate Holder who manufactured the welded parts as it appears on the "*Certificate of Authorization.*"
(5)	If applicable, document the unique purchase order, job, or tracking number assigned by organization performing work.
(6)	Document name and address of organization that purchased the parts for incorporation into the repair or alteration. If the part's origin is unknown or the part was built for stock, so state.
(7)	Document name of organization responsible for specifying the code design conditions, if known. If origin of design conditions are not known, state "unknown."
(8)	Document name of organization responsible for performing the code design, if known. If code design organization is not known, state "unknown."
(9)	Name, section, and division of the design code, if known. If the design is not known, state "unknown."
(10)	Indicate code edition year used for fabrication.
(11)	Indicate code addenda date used for fabrication, if applicable.
(12)	Indicate the code paragraph reference for formula used to establish the MAWP, if known. If the code reference of the formula is not known, state "unknown."
(13)	If available, identify component by part's original name, function, or use the original equipment manufacturer's "mark or item number."
(14)	Indicate quantity of named parts.
(15)	Match line number of part references for Identification of Parts in item 5 and the Description of Parts in item 6.
(16)	Indicate manufacturer's serial number or identification number for the named part.

TABLE S9.4 CONT'D

Reference to Circled Numbers in the Form	Description
(17)	Indicate drawing number for the named part.
(18)	Indicate maximum allowable working pressure (MAWP) for the part, if known.
(19)	Indicate test pressure, if applied.
(20)	Identify the year in which fabrication/construction of the item was completed.
(21)	Use inside diameter for size: indicate shape as square, round, etc.
(22)	Indicate the complete material specification number and grade.
(23)	Indicate nominal thickness of plate and minimum thickness after forming.
(24)	Indicate shape as flat, dished, ellipsoidal, or hemispherical.
(25)	Indicate minimum thickness after forming.
(26)	Indicate the complete material specification number and grade for the head or end.
(27)	Indicate outside diameter.
(28)	Indicate minimum thickness of tubes.
(29)	Indicate the complete material specification number and grade for tubes.
(30)	Indicate any additional information pertaining to the work involved (e.g. code cases). The part manufacturer is to indicate the extent he has performed any or all of the design function. If only a portion of the design, state which portion.
(31)	When registering a Form R-3 Report with the National Board, this line is solely designated for a unique sequential number assigned by the "R" Certificate Holder. When the "R" Form is not to be registered, indicated so by "N/A". As described in NBIC Part 3, Paragraph 5.6, a log shall be maintained identifying unique and sequentially numbered Form "R" reports that are registered with the National Board.
(32)	If applicable, document the unique purchase order, job, or tracking number assigned by organization performing work.
(33)	Type or print name of authorized representative of the "R" Certificate Holder attesting to accuracy of the work described.
(34)	Indicate National Board "R" Certificate of Authorization number.
(35)	Indicate month, day, and year that the "R" Certificate of Authorization expires.
(36)	Indicate the date the repair was certified.
(37)	Record name of "R" Certificate Holder who performed the described work, using full name as shown on the Certificate of Authorization or an abbreviation acceptable to the National Board.

TABLE S9.4 CONT'D

Reference to Circled Numbers in the Form	Description
(38)	Signature of National Board "R" Certificate of Authorization authorized representative.
(39)	Type or print name of Inspector.
(40)	Indicate Inspector's Jurisdiction.
(41)	Indicate Inspector's employer.
(42)	Indicate address of Inspector's employer (city and state or province).
~~(43)~~	~~Indicate month, day, and year of final inspection by Inspector.~~
~~(44)~~ 43	Indicate the month, day and year the completed Form "R" was signed by the Inspector.
~~(45)~~ 44	Signature of Inspector.
~~(46)~~ 45	Inspector's National Board commission number and endorsement that qualifies the Inspector to sign this report, and when required by the Jurisdiction, the applicable State or Provincial numbers.

S9.5 FORM R-4, REPORT SUPPLEMENT SHEET, NB-231

FIGURE S9.5.1
FORM R-4, PAGE 1 OF 1

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NB-231, Rev. 3, (12/08/16)

FORM R-4 REPORT SUPPLEMENT SHEET

in accordance with provisions of the *National Board Inspection Code*

(1) _____ (form "R" referenced)

(2) _____ (P.O. no., job no., etc.)

1. WORK PERFORMED BY: (3) _____ (name)

_____ (address)

2. OWNER: (4) _____ (name)

_____ (address)

3. LOCATION OF INSTALLATION: (5) _____ (name)

_____ (address)

REFERENCE LINE NO. CONTINUED FROM FORM R– (6) _____

(7)	(8)

Date (9) _____, _____ Signed (10) _____ (authorized representative) Name (11) _____ (Name of "R" certificate holder)

Date (12) _____, _____ Signed (13) _____ (inspector) Commissions (14) _____ (National Board and jurisdiction no. including endorsement)

This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors • 1055 Crupper Avenue, Columbus, Ohio 43229-1183 Page 1 of 1

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TABLE S9.5
GUIDE FOR COMPLETING FORM R-4, REPORT SUPPLEMENT SHEET, NB-231

Reference to Circled Numbers in the Form	Description
(1)	When registering a Form "R" Report with the National Board, this line is solely designated for a unique sequential number assigned by the "R" Certificate Holder. When the "R" Form is not to be registered, indicate so by "N/A". As described in NBIC Part 3, Paragraph 5.6, a log shall be maintained identifying unique and sequentially numbered Form "R" reports that are registered with the National Board. Complete information identical to that shown on the Form "R" to which this sheet is a supplement.
(2)	If applicable, document the unique purchase order, job, or tracking number, assigned by the organization performing work.
(3)	The name and address of the Certificate Holder performing the work as it appears on the "Certificate of Authorization."
(4)	Name and address of the owner of the pressure-retaining item.
(5)	Name and address of plant or facility where the pressure-retaining item is installed.
(6)	Indicate the Form "R" type to which this report is supplementary. Example: Form R-1, Form R-2, Form R-3
(7)	Indicate the reference line number from the Form "R" to which this report is supplementary.
(8)	Complete information for which there was insufficient space on the reference Form "R".
(9)	Indicate the date certified.
(10)	Signature of the repair organizations authorized representative.
(11)	Record name of "R" Certificate Holder who performed the described work, using full name as shown on the Certificate of Authorization or an abbreviation acceptable to the National Board.
(12)	Indicate the date the form was completed by the Inspector.
(13)	Signature of the Inspector.
(14)	Inspector's National Board commission number and endorsement that qualifies the Inspector to sign this report, and when required by the Jurisdiction, the applicable State or Provincial numbers.

S9.6 FORM NR-1, REPORT OF REPAIR/REPLACEMENT ACTIVITIES FOR NUCLEAR FACILITIES, NB-81

FIGURE S9.6.1
FORM NR-1, PAGE 1 OF 3

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NB-81, Rev. 8, (03/04/21)

FORM NR-1, REPORT OF REPAIR/REPLACEMENT ACTIVITIES FOR NUCLEAR FACILITIES

CATEGORY OF ACTIVITY: 1 ☐ 2 ☐ 3 ☐

☐ REPAIR/REPLACEMENT ☐ RE-RATING

(2) (NR Form Registration No.)

(3) (R/R Plan No., Job No., etc.)

1. WORK PERFORMED BY: (1) (name of "NR" certificate holder)

(address)

2. OWNER: (4) (name)

(address)

3. NAME, ADDRESS, AND IDENTIFICATION OF NUCLEAR FACILITY:

(5) (name)

(address)

(unit identification)

4. SYSTEM/COMPONENT: (6) ORIGINAL DESIGN SPECIFICATION NO./REV.: (7)

5. CONSTRUCTION CODE, SECTION & EDITION/ADDENDA AND APPLICABLE CODE CASES USED FOR THE SYSTEM OR COMPONENT: (8)

6. NBIC EDITION USED FOR PERFORMING REPAIRS/REPLACEMENT OR RE-RATING ACTIVITY: (9)

7. DESIGN RESPONSIBILITY: (10) CODE and ED/AD: (11)

8. TESTS CONDUCTED: ☐ Hydrostatic ☐ Pneumatic ☐ System Leakage ☐ Pressure _____ psi (MPa)
(12) ☐ Exempt ☐ Other

9. NUMBER OF COMPONENTS REPAIRED/REPLACED AND/OR RE-RATED (refer to page 2): (13)

10. DESCRIPTION OF WORK (use of properly identified additional sheet[s] or sketch[es] is acceptable):
(14)

11. REMARKS: (15)

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FIGURE S9.6.2
FORM NR-1, PAGE 2 OF 3

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NB-81, Rev. 8, (03/04/21)

(2) (**NR** Form Registration No.)

(3) (R/R Plan No., Job No., etc.)

WORK PERFORMED BY: (1)

(Name of "**NR**" certificate holder)

(Address of "**NR**" certificate holder)

COMPONENT IDENTIFICATION

No. (16)	Type of Item (17)	Mfg. Name (18)	Serial No. (19)	Nat'l Bd No. (20)	Code Class (21)	Code Section (22)	Year/ Addenda (23)	Code Case (24)	Revised Design Specification No./Rev. or Design Reconciliation No./Rev. (25)

FIGURE S9.6.3
FORM NR-1, PAGE 3 OF 3

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NB-81, Rev. 8, (03/04/21)

(**NR** Form Registration No.)

(R/R Plan No., Job No., etc.)

CERTIFICATE OF COMPLIANCE

I, (26) _____, employed by (27) _____
certify that to the best of my knowledge and belief the statements made in this report are correct and the repair/replacement activities or re-rating described above conform to (28) _____ and the *National Board Inspection Code* "**NR**" rules.

National Board *Certificate of Authorization* No. (29) _____ Expiration date: (30) _____

Signed: (31) _____ Date: (32) _____

Title: (33) _____
(authorized representative)

CERTIFICATE OF INSPECTION

I, (34) _____, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and certificate of competency, where required, issued by the Jurisdiction of (35) _____ and employed by (36) _____ have inspected the repair/replacement and/or re-rating activities described in this report on (37) _____ and state that to the best of my knowledge and belief, these activities have been completed in accordance with the Code specified and the *National Board Inspection Code* "**NR**" rules.

By signing this certificate, neither the undersigned nor my employer makes any warranty, expressed or implied, concerning the work described in this report. Furthermore, neither the undersigned nor my employer shall be liable in any manner for any personal injury, property damage, or loss of any kind arising from or connected with this inspection.

Signed: ~~(38)~~ 37 Date: ~~(39)~~ 38 Commissions ~~(40)~~ 39
(inspector) (National Board and endorsement)

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TABLE S9.6

GUIDE FOR COMPLETING FORM NR-1, REPORT OF REPAIR/REPLACEMENT ACTIVITIES FOR NUCLEAR FACILITIES, NB-81

Reference to Circled Numbers in the Form	Description
	Title Block: Check type of activity, repair/replacement and/or rerating, as applicable.
	Check category of activity, 1, 2, or 3, as described in Part 3, Paragraph 1.6.2.
(1)	Name and address of the organization, as shown on the National Board "NR" Certificate of Authorization, which performed the activity.
(2)	Indicate NR Form Registration Number.
(3)	Indicate the repair/replacement plan, job number, etc., as applicable, assigned by the organization that performed the work for traceability to documentation.
(4)	Name and address of the owner of the nuclear facility.
(5)	Name and address of the nuclear power plant and, if applicable, identification of the unit.
(6)	Identify the system or component (e.g., residual heat removal, reactor coolant) with which the repair/replacement and/or re-rating activity is associated.
(7)	Identify the original design specification number and revision for the system or component listed in line 4.
(8)	Identify the original construction code, section, edition/addenda and applicable code cases used for the system or component identified in line 4.
(9)	NBIC Edition used for performing activities specified on this form.
(10)	Organization having responsibility for design when there is a change from the original design specification.
(11)	Identify code, section, edition/addenda and applicable code cases used for design, when applicable.
(12)	Check the type of test conducted (e.g., hydrostatic, pneumatic, system leakage, exempt, or other) and indicate the pressure applied when applicable.
(13)	Indicate the number of components where work was performed. Each component shall be indicated on page 2 of the form NR-1.
(14)	Provide a detailed summary describing the scope of work completed. Information to be considered should include type of work (welding, brazing, fusing), location, steps taken for removal or acceptance of defects, examinations, testing, heat treat, and other special processes or methods utilized. If Necessary, attach additional data, sketch, drawing, Form R-4, etc. In the remarks section state if additional data is attached.
(15)	Indicate any additional information pertaining to the work, including manufacturer's data reports.

TABLE S9.6 CONT'D

Reference to Circled Numbers in the Form	Description
(16)	Number in sequence beginning with No. 1 to identify each component work was performed. This number may be used to correspond with the detailed description of work performed.
(17)	Identify the type of item. i.e. piping, pump, valve, etc.
(18)	Identify the manufacturer's name of component.
(19)	Identify the manufacturer's serial no. or other assigned number for traceability.
(20)	Identify the National Board registration number, if previously assigned.
(21)	Identify the code class criteria, as assigned for each component.
(22)	Identify the code section used to perform work.
(23)	Identify Code section year and/or addenda used to perform work.
(24)	Identify any code cases used for work performed.
(25)	Identify any revisions to be made to the design specifications or if any design reconciliations were performed.
(26)	Type or print name of authorized representative from the certificate holder.
(27)	Name of the organization that performed the identified work, using the full name as shown on the Certificate of Authorization, or an abbreviation acceptable to the National Board.
(28)	Indicate code section as applicable to the repair/replacement activity and/or re-rating activity performed.
(29)	Indicate National Board Certificate of Authorization number.
(30)	Indicate month, day, and year the certificate expires.
(31)	Signature of authorized representative from the NR certificate holder.
(32)	Indicate month, day and year of signature by the Authorized Representative.
(33)	Title of authorized representative as defined in the Quality Program.
(34)	Type or print name of Authorized Nuclear Inspector.
(35)	Indicate the Jurisdiction where the activity is performed, when required.
(36)	Indicate Authorized Nuclear Inspector's employer.
~~(37)~~	~~Indicate month, day, and year of inspection by the Authorized Nuclear Inspector.~~

TABLE S9.6 CONT'D

Reference to Circled Numbers in the Form	Description
~~(38)~~ 37	Signature of Authorized Nuclear Inspector.
~~(39)~~ 38	Indicate month, day, and year of signature by the Authorized Nuclear Inspector.
~~(40)~~ 39	National Board Commission number and required endorsements.

S9.7 FORM NVR-1, REPORT OF REPAIR/REPLACEMENT ACTIVITIES FOR NUCLEAR PRESSURE RELIEF DEVICES, NB-160

FIGURE S9.7.1
FORM NVR-1, PAGE 1 OF 3

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NB-160, Rev. 8, (03/30/17)

FORM NVR-1, REPORT OF REPAIR/REPLACEMENT ACTIVITIES FOR NUCLEAR PRESSURE RELIEF DEVICES

(2) (NVR Form Registration No.)

(3) (R/R Plan No., Job No., etc.)

CATEGORY OF ACTIVITY: 1 ☐ 2 ☐ 3 ☐

☐ REPAIR/REPLACEMENT ☐ RE-RATING

1. WORK PERFORMED BY: (1) (name of "NVR" authorized organization)
   (address)
2. WORK PERFORMED FOR: (4) (name)
   (address)
3. OWNER: (5) (name)
   (address)
4. NAME, ADDRESS, AND IDENTIFICATION OF NUCLEAR FACILITY: (6) (name)
   (address)/ (unit identification)
5. CODE APPLICABLE FOR INSERVICE INSPECTION: (7) (edition) (addenda) (code case(s))
6. CODE USED FOR REPAIR/REPLACEMENT ACTIVITY: (8) (edition) (addenda) (code case(s))
7. NBIC USED FOR REPAIR/REPLACEMENT ACTIVITY: (9) (edition)
8. DESIGN RESPONSIBILITY: (10)
9. **REPAIRED PRESSURE RELIEF DEVICE: SEE PAGE 2**
10. OPENING PRESSURE: (11) BLOWDOWN (if applicable): (12)
11. SET PRESSURE AND BLOWDOWN ADJUSTMENT MADE AT: (13) USING: (14)
12. DESCRIPTION OF WORK: (include name and identifying number of replacement parts):
    (15)

12. REMARKS: (16)

This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors • 1055 Crupper Avenue, Columbus, Ohio 43229-1183 Page 1 of 3

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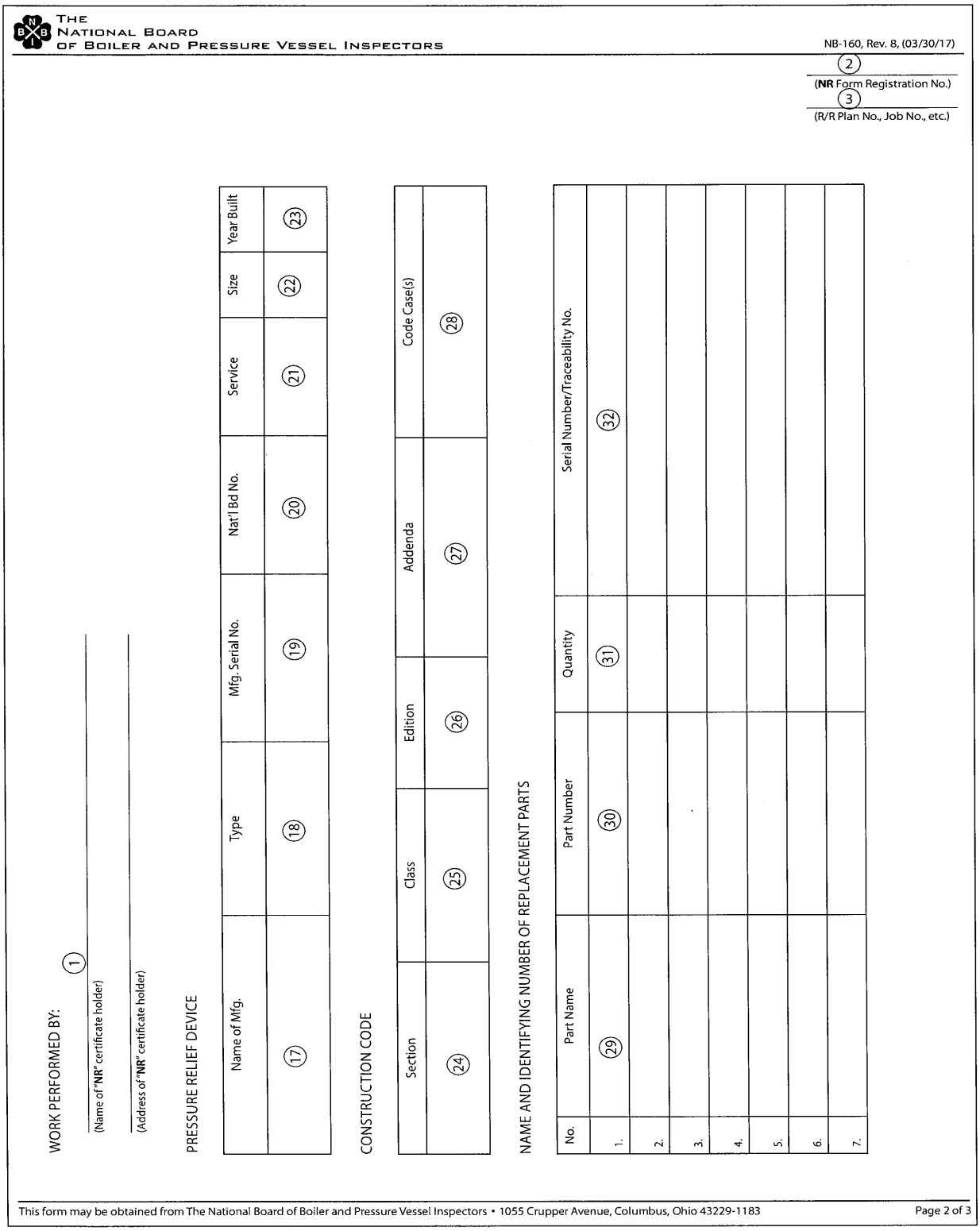
FIGURE S9.7.2
FORM NVR-1, PAGE 2 OF 3



THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NB-160, Rev. 8, (03/30/17)

(2) (NR Form Registration No.)

(3) (R/R Plan No., Job No., etc.)

WORK PERFORMED BY: (1)

(Name of "NR" certificate holder)

(Address of "NR" certificate holder)

PRESSURE RELIEF DEVICE

Name of Mfg.	Type	Mfg. Serial No.	Nat'l Bd No.	Service	Size	Year Built
(17)	(18)	(19)	(20)	(21)	(22)	(23)

CONSTRUCTION CODE

Section	Class	Edition	Addenda	Code Case(s)
(24)	(25)	(26)	(27)	(28)

NAME AND IDENTIFYING NUMBER OF REPLACEMENT PARTS

No.	Part Name	Part Number	Quantity	Serial Number/Traceability No.
1.	(29)	(30)	(31)	(32)
2.				
3.				
4.				
5.				
6.				
7.				

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FIGURE S9.7.3
FORM NVR-1, PAGE 3 OF 3

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NB-160, Rev. 8, (03/30/17)

_____ (form "**NVR**" registration no.)

_____ (R/R Plan No., Job No., etc.)

CERTIFICATE OF COMPLIANCE

I, (33) _____, certify that to the best of my knowledge and belief the statements made in this report are correct and the repair/replacement of the pressure relief devices described above conform to (34) _____ and the *National Board Inspection Code* "**VR**" & "**NR**" rules.

National Board *Certificate of Authorization* No. (35) _____ to use the "**VR**" stamp expires (36) _____
National Board *Certificate of Authorization* No. (37) _____ to use the "**NR**" stamp expires (38) _____
Date (39) _____ Signed (40) _____ (41) _____
(authorized representative) (title)

CERTIFICATE OF INSPECTION

I, (42) _____, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and certificate of competency, where required, issued by the Jurisdiction of (43) _____ and employed by (44) _____ of (45) _____ have inspected the repair/replacement described in this report on (46) _____ and state that to the best of my knowledge and belief, this repair/replacement has been completed in accordance with the Code specified and the *National Board Inspection Code* "**VR**" & "**NR**" rules.

By signing this certificate, neither the undersigned nor my employer makes any warranty, expressed or implied, concerning the repair/replacement described in this report. Furthermore, neither the undersigned nor my employer shall be liable in any manner for any personal injury, property damage, or loss of any kind arising from or connected with this inspection.

Signed (47) 46 Date (48) 47 (49) 48
(inspector) (National Board and endorsement)

This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors • 1055 Crupper Avenue, Columbus, Ohio 43229-1183 Page 3 of 3

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TABLE S9.7

GUIDE FOR COMPLETING FORM NVR-1, REPORT OF REPAIR/REPLACEMENT ACTIVITIES FOR NUCLEAR PRESSURE RELIEF DEVICES, NB-160

Reference to Circled Numbers in the Form	Description
	Title Block: Check type of activity, repair/replacement and/or rerating, as applicable.
	Check category of activity, 1, 2, or 3, as described in Part 3, Paragraph 1.6.2.
(1)	Name and address of the organization, as shown on the National Board "VR" and "NR" Certificates of Authorization, which performed the activity.
(2)	Indicate NVR Form Registration Number.
(3)	Indicate the repair/replacement plan number, job number, etc., as applicable for traceability, assigned by the organization that performed the work.
(4)	Name and address of the organization for which the work was performed.
(5)	Name and address of the owner nuclear facility.
(6)	Name and address of the nuclear facility and, if applicable, identification of the unit.
(7)	Identify the edition, addenda, and as applicable, code cases of the code used for the inservice inspection activity.
(8)	Identify the edition, addenda, and as applicable, code cases of the code used for the repair/replacement activity.
(9)	Identify the NBIC edition used for the repair/replacement activity.
(10)	Identify the organization responsible for design or design reconciliation, if applicable.
(11)	Indicate the set pressure of the valve.
(12)	Indicate the blowdown, if applicable, as a percentage of set pressure.
(13)	Indicate the location of testing.
(14)	Indicate medium (steam, air, etc.) used for the adjustment of the set pressure and, if applicable, blowdown.
(15)	Provide a detailed summary describing the scope of work completed. Information to be considered should include type of work (welding, brazing, fusing), location, steps taken for removal or acceptance of defects, examinations, testing, heat treat, and other special processes or methods utilized. If Necessary, attach additional data, sketch, drawing, Form R-4, etc. If additional data is attached, so state in the remarks section.
(16)	Indicate any additional information pertaining to the work, such as, additional documentation that is attached to this form to further support item 15.
(17)	Manufacturer's name of the affected item.

TABLE S9.7 CONT'D

Reference to Circled Numbers in the Form	Description
(18)	Describe the type of pressure relief device (e.g., safety valve, safety relief valve, pressure relief valve).
(19)	Manufacturer's serial number of the affected item.
(20)	National Board number, if applicable, of the affected item.
(21)	Indicate the service as steam, liquid, air/gas, etc.
(22)	Indicate the pressure relief device by inlet size, in inches.
(23)	Indicate the year the affected item was manufactured.
(24)	Indicate the name, section and division of the original construction code for the affected item.
(25)	Indicate the code class for the affected item as applicable, i.e. Class 1, 2 or 3.
(26)	Indicate the construction code edition for the affected item.
(27)	Indicate the construction code addenda, as applicable, for the affected item.
(28)	Indicate any applicable code cases used for manufacturing of the affected item.
(29)	Name of the replacement part.
(30)	Identifying number of the replacement part.
(31)	Number/quantity of each replacement part used.
(32)	Indicate the Serial number or other traceability used by the manufacturer of the replacement part.
(33)	Type or print name of authorized representative from the certificate holder.
(34)	Indicate code as applicable to the repair/replacement activity performed.
(35)	Indicate National Board Certificate of Authorization number, if applicable for the "VR" Stamp.
(36)	Indicate month, day, and year the certificate expires, if applicable for the "VR" Stamp.
(37)	Indicate National Board Certificate of Authorization number, if applicable for the "NR" Stamp.
(38)	Indicate month, day, and year the certificate expires, if applicable for the "NR" Stamp.
(39)	Signature of authorized representative from the certificate holder defined in item 27 above.

TABLE S9.7 CONT'D

Reference to Circled Numbers in the Form	Description
(40)	Indicate month, day, and year of signature by the authorized representative.
(41)	Title of authorized representative as defined in the Quality Program.
(42)	Type or print name of Authorized Nuclear Inspector.
(43)	Indicate the Jurisdiction where the activity is performed, when required.
(44)	Indicate Authorized Nuclear Inspector's employer.
(45)	Indicate address of Authorized Nuclear Inspector's employer (city and state or province).
~~(46)~~	~~Indicate month, day, and year of inspection by the Authorized Nuclear Inspector.~~
~~(47)~~ 46	Signature of Authorized Nuclear Inspector defined in item 42 above.
~~(48)~~ 47	Indicate month, day, and year of signature by the Authorized Nuclear Inspector.
~~(49)~~ 48	National Board Commission number and required endorsements.

ITEM 21-XX: Update Table 2.3

2.3 STANDARD WELDING PROCEDURE SPECIFICATIONS (SWPSs)

a) One or more SWPSs from NBIC Part 3, Table 2.3 may be used as an alternative to one or more WPS documents qualified by the organization making the repair or alteration, provided the organization accepts by certification (contained therein) full responsibility for the application of the SWPS in conformance with the Application as stated in the SWPS. When using SWPSs, all variables listed on the Standard Welding Procedure are considered essential and, therefore, the repair organization cannot deviate, modify, amend, or revise any SWPS. US Customary Units or metric units may be used for all SWPSs in NBIC Part 3, Table 2.3, but one system shall be used for application of the entire SWPS in accordance with the metric conversions contained in the SWPS. The user may issue supplementary instructions as allowed by the SWPS. Standard Welding Procedures Specifications shall not be used in the same product joint together with the other Standard Welding Procedure Specifications or other welding procedure specifications qualified by the organization. SWPSs may be purchased at the AWS Bookstore at http://pubs.aws.org.

b) The AWS reaffirms, amends or revises SWPSs in accordance with ANSI procedures.

c) The use of previous versions of the listed SWPSs is permitted. Previous versions include Amended, Reaffirmed Revised or Superseded SWPSs regardless of the publication date.

TABLE 2.3

SWPS DESIGNATION: YEAR

B2.1-1-001: 2020	B2.1-1-201: 2019	B2.1-8-215: 2012	B2.1-1/8-229: 2013
B2.1-1-002: 2020	B2.1-1-202: 2019	B2.1-8-216: 2012	B2.1-1/8-230: 2013
B2.1-1-016: 2018	B2.1-1-203: 2019	B2.1-4-217: 2021	B2.1-1/8-231: 2015
B2.1-1-017: 2018	B2.1-1-204: 2019	B2.1-4-218: 2021	B2.1-1-232: 2020
B2.1-1-018: 2021	B2.1-1-205: 2019	B2.1-4-219: 2021	B2.1-1-233: 2020
B2.1-1-019: 2018	B2.1-1-206: 2019	B2.1-4-220: 2021	B2.1-1-234: 2021
B2.1-1-020: 2018	B2.1-1-207: 2019	B2.1-4-221: 2021	B2.1-1-235: 2021
B2.1-1-021: 2018	B2.1-1-208: 2019	B2.1-5A-222: 2021	
B2.1-1-022: 2018	B2.1-1-209: 2019	B2.1-5A-223: 2021	
B2.1-8-023: 2018	B2.1-1-210: 2012	B2.1-5A-224: 2021	
B2.1-8-024: 2012	B2.1-1-211: 2012	B2.1-5A-225: 2021	
B2.1-8-025: 2012	B2.1-8-212: 2012	B2.1-5A-226: 2021	
B2.1-1-026: 2018	B2.1-8-213: 2012	B2.1-1/8-227: 2013	
B2.1-1-027: 2018	B2.1-8-214: 2012	B2.1-1/8-228: 2013	

STATUS:
2022 14 SWPSs: All have been updated and are presently being balloted in committee
2021 13 SWPSs: Approved and at the Printers targeting a December 2021 release
2020 4 SWPSs Done
2019 9 SWPSs Done
2018 9 SWPSs Done

TOTAL: 49 SWPSs

Terry,
This table represents where we are and where we are going with Table 2.3. I will prepare a ballot in the Fall to correct a typo and delete the word table and submit (hopefully) 13 SWPSs for NBIC adoption.
Jim Sekely

11/14/21

PROPOSED REVISION OR ADDITION

Item No.

A 21-71

Subject/Title

Remove the mechanical portion of tube plugging from 3.3.4.9. Only address i

NBIC Location

Part: Repairs and Alterations; Section: 3; Paragraph: 3.4.9

Project Manager and Task Group

Source (Name/Email)

Kathy Moore / kathymoore@joemoorecompany.com

Statement of Need

Removing the mechanical portion of the text. Many Jurisdictions are having a difficult time enforcing that part of the NBIC

Background Information

Mr, Kinney wrote on the Chief's Forum and asked the Chiefs what they thought of 3.3.4.9. They wanted the mechanical portion dropped.

Existing Text

3.3.4.9 TUBE PLUGGING IN FIRETUBE BOILERS When the replacement of a tube in a firetube boiler is not practicable at the time the defective tube is detected, with the concurrence of the owner, Inspector, and when required, the Jurisdiction, the tube may be plugged using the following course of repair: a) The scope of work, type of plug and method of retention; whether welded or mechanical interface, shall be evaluated by the “R” Certificate Holder performing the repair and reviewed with the Inspector, and when required, the Jurisdiction. b) When the method of plugging is by welding, strength calculations for the size of the weld shall be in accordance with the original code of construction. The “R” Certificate Holder performing this repair shall weld the plug to the tube, or to the tube sheet, or a combination of both. c) Plugging a tube in a firetube boiler is recognized as an alternative to the replacement of a firetube and may be further limited as a method of repair by the number of tubes plugged and their location; scattered or clustered. The operational effects on the waterside pressure boundary or membrane and the effects on the combustion process throughout the boiler should be considered prior to plugging. d) The boiler may be returned to service for a period of time agreed upon by the owner, the Inspector, and when required, the Jurisdiction. e) The Form R-1 shall be completed for the plugging of firetubes, identifying the means of plug retention; mechanical or by welding.

Proposed Text

Where it is not practicable to mechanically plug a tube in a firetube boiler, the plug may be secured to the tube and/or tubesheet by welding with the concurrence of the owner, the Inspector, and the Jurisdiction where the pressure-retaining item is installed, where required. The following course of repair shall be followed: a) The scope of work, type of plug and method of retention, shall be evaluated by the “R” Certificate Holder performing. b) Strength calculations for the size of the weld shall be performed in accordance with the original code of construction. c) The operational effects on the waterside pressure boundary or membrane and the effects on the combustion process throughout the boiler should be considered prior to plugging as this may limit the quantity of tubes plugged. d) The boiler may be returned to service for a period of time agreed upon by the owner, the Inspector, and the Jurisdiction where the pressure-retaining item is installed, where required. e) The Form R-1 shall be completed for the welded plugging of
firetubes.

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

PROPOSED REVISION OR ADDITION

Item No.

A 21-77

Subject/Title

Repairs/Alterations of Impact Tested Vessels

NBIC Location

Part: Repairs and Alterations; Section: 3; Paragraph: 3.3.6

Project Manager and Task Group

Source (Name/Email)

Robert Underwood / robert_underwood@hsb.com

Statement of Need

There is an urgent need to address these concerns as the repair firms cannot comply with the existing wording in 3.3.6. The plan is to incorporate this item into the 2023 Edition of Part 3 and propose a corresponding Intent Interpretation that would provided guidance to NBIC users as soon as possible.

Background Information

Existing paragraph 3.3.6 contains some requirements that the repair firm cannot comply with such as determining the heat treated condition and the notch toughness characteristics of the material to be repaired. It also contains references to dead links in the NBIC that provide no guidance to the repair firm. This proposal would eliminate the requirements of knowing the heat treated condition and the notch toughness characteristics of the material to be repaired and simply refer back to the original construction code in regards to WPS qualification. The proposal also would move the location of these requirements from paragraph 3.3.6 (which addresses repair only) to 3.2.8 which addresses repairs and alterations.

Existing Text

3.3.6 PRESSURE VESSEL IMPACT TESTING a) Welding procedures used for repairs shall be qualified with impact testing when required by the original code of construction. The requirements for impact testing shall be in accordance with the rules of the original code of construction except that vessel (production) impact testing is not required. b) The test material for the welding procedure qualification with impact testing shall be of the same P-number and Group number, and heat-treated condition as the material being repaired. 1) In the event that the notch toughness of the material to be repaired is unknown, evidence from tests of that material or from another acceptable source (see NBIC Part 3, 2.5.3) may be used for the base metal notch toughness when qualifying the WPS as required in NBIC Part 3, 2.5.3.2 h). 2) In the event that the original material specification is obsolete, the material used for the test coupon should conform as closely as possible to the original material used for construction based on nominal composition and carbon equivalent (IIW Formula CE = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15; elements are expressed in Weight Percent Amounts), and heat-treated condition, but in no case shall the material be lower in strength.

Proposed Text

3.2.8 PRESSURE VESSEL IMPACT TESTING a) Welding procedures used for repairs shall be qualified with impact testing when required by the original code of construction. The requirements for impact testing shall be in accordance with the rules of the original code of construction except that vessel (production) impact testing is not required. b) The test material for the welding procedure qualification with impact testing shall be of the same P-number and Group number as the material being repaired.,

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

PROPOSED REVISION OR ADDITION

Item No.

A 21-78

Subject/Title

Alternative Weld Joint For Historical Boiler Barrel Replacement

NBIC Location

Part: Repairs and Alterations; Section: Supplement 2; Paragraph: S2.13.9.5(e)

Project Manager and Task Group

Source (Name/Email)

Robert Underwood / robert_underwood@hsb.com

Statement of Need

This proposal would introduce double welded lap joint connections of the barrel to wrapper sheet in lieu of riveted joints. It is not practical in many cases for repair firms to connect this joint by riveting.

Background Information

Historical boilers were manufactured with riveted joints, however in many cases it's more practical to use welded joints when restoring historical boilers. However, ASME Section I does not allow fillet welded lap joints when connecting replacement barrels to the wrapper sheet. The strength of a double fillet welded lap joint has proven to be equal, if not greater in strength than riveted joint designs and this proposal will introduce this type of joint as an alternative to riveted lap joints.

Existing Text	Proposed Text
	1) Double fillet welded lap joints connecting the replacement barrel to the wrapper sheet with a thickness not over 5/8 in. (16 mm) may be used as an alternative to double-riveted lap joint connections. (See NBIC Part 3, Figure S2.13.9.5)

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

PROPOSED REVISION OR ADDITION

Item No.

A 21-82

Subject/Title

Examples of Repairs

NBIC Location

Part: Repairs and Alterations; Section: 3; Paragraph: 3.3.3(s)

Project Manager and Task Group

Robert Underwood, Subcommittee Repairs/Alterations

Source (Name/Email)

Robert Underwood / robert_underwood@hsb.com

Statement of Need

Adding "repair" to 3.3.3(s) would then address use of different weld material. Currently 3.3.3(s) only addresses replacement of the part, not repair (Repair is addressed in 3.3.3(r)).

Background Information

We have had some recent questions from repair firms about using different weld metal when performing repairs of pressure retaining items. The NBIC does not directly address use of weld metal that is different than the original design. Paragraph 3.3.3(r) addresses "repair" or replacement of pressure parts which I think covers the weld metal, but 3.3.3(s) only addresses "replacement" of the pressure part. This proposal would simply add "repair" to 3.3.3(s) which would address use of weld metal of a different composition.

Existing Text	**Proposed Text**
Replacement of a pressure-retaining part with a material of different nominal composition and, equal to or greater in allowable stress from that used in the original design, provided the replacement material satisfies the material and design requirements of the original code of construction under which the vessel was built. The minimum required thickness shall be at least equal to the thickness stated on the original Manufacturer's Data Report;	The repair or replacement of a pressure-retaining part with a material of different nominal composition and, equal to or greater in allowable stress from that used in the original design, provided the replacement material satisfies the material and design requirements of the original code of construction under which the vessel was built. The minimum required thickness shall be at least equal to the thickness stated on the original Manufacturer's Data Report;

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

Brodeur	Marianne	National Board Certificate Holders	Chair	01/30/2022	Details
Cox	J. Alton	General Interest	Vice Chair	01/30/2022	Details
Beirne	Thomas		Secretary	01/30/2099	Details
Beise	Kim	National Board Certificate Holders	Member	01/30/2023	Details
DeMichael	Denis	Users	Member	07/30/2024	Details
Dhobi	Prakash	National Board Certificate Holders	Member	07/30/2023	Details
Donaldson	Alfred	Manufacturers	Member	01/30/2023	Details
Donalson	Robert	Manufacturers	Member	07/30/2024	Details
Marek	Daniel	General Interest	Member	01/30/2022	Details
McCaffrey	Raymond	General Interest	Member	08/30/2023	Details
McHugh	David	National Board Certificate Holders	Member	01/30/2023	Details
Nutter	Brandon	National Board Certificate Holders	Member	01/30/2022	Details
Patel	Thakor	Manufacturers	Member	01/30/2022	Details
Renaldo	Adam	Users	Member	01/30/2022	Details
Schirmer	Delton	Authorized Inspection Agencies	Member	01/30/2023	Details
Simms	Jay	Manufacturers	Member	07/30/2024	Details
Wolf	Jon	Authorized Inspection Agencies	Member	01/30/2023	Details

2021 NBIC Part 4, 2.4.4.3 b) errata:

How the section currently reads:	How it should read:
Part 4: **2.4.4.3 REQUIREMENTS FOR COMMON CONNECTION FOR TWO OR MORE VALVES** a) When a potable water heater is fitted with two or more temperature and pressure relief valves on one connection, this connection shall have a cross sectional area not less than the combined areas of inlet connections of all the temperature and pressure relief valves with which it connects. b) When the size of the water heater requires a temperature and pressure relief valve larger than NPS 4 (DN 100) two or more valves having the required combined capacity shall be used. When two or more valves are used on a water heater, they may be single, directly attached, or installed on a Y-base.	**Part 4:** **2.4.4.3 REQUIREMENTS FOR COMMON CONNECTION FOR TWO OR MORE VALVES** a) When a potable water heater is fitted with two or more temperature and pressure relief valves on one connection, this connection shall have a cross sectional area not less than the combined areas of inlet connections of all the temperature and pressure relief valves with which it connects. b) When the size of the water heater requires a temperature and pressure relief valve larger than NPS 4 (DN 100) two or more valves having the required combined capacity shall be used. ~~When two or more valves are used on a water heater, they may be single, directly attached, or installed on a Y-base.~~

Item 17-128 for reference:

Part 4:

2.4.4.3 REQUIREMENTS FOR COMMON CONNECTION FOR TWO OR MORE VALVES

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

~~b) When a Y-base is used, the inlet area shall be not less than the combined outlet areas.~~

~~c)~~b) When the size of the water heater requires a temperature and pressure relief valve larger than NPS 4 (DN 100) two or more valves having the required combined capacity shall be used. ~~When two or more valves are used on a water heater, they may be single, directly attached, or installed on a Y-base.~~

Part 1:

3.9.4.3 REQUIREMENTS FOR COMMON CONNECTION FOR TWO OR MORE VALVES

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

~~b) When a Y-base is used, the inlet area shall be not less than the combined outlet areas.~~

~~c)~~b) When the size of the water heater requires a temperature and pressure relief valve larger than NPS 4 (DN 100) two or more valves having the required combined capacity shall be used. ~~When two or more valves are used on a water heater, they may be single, directly attached, or installed on a Y-base.~~

PROPOSED INTERPRETATION

Item No.

21-62

Subject/Title

Verification of existing spring during repair activities

Project Manager and Task Group

Source (Name/Email)

Eben Creaser / eben.creaser@gnb.ca

Statement of Need

This requirement has created an administrative requirement that potentially prevents a VR Stamp holder from applying the "VR" stamp to valves they have repaired. The requirement is negatively impacting owners, and jurisdictions that enforce the NBIC Part 4. This clause introduces a unique requirement in the BPV industry to confirm that code material in a Code stamped item be verified and traceable at all time after the item is ASME code stamped but the verification can only be provided by the manufacturer. Historically, any valve received or worked on that was sealed by a VR Stamp holder or in the case of an initial repair the ASME assembler was deemed to be Code compliant and no further verification was needed recognizing the validity and continuity of the ASME and VR quality programs. It is clearly understood that if a spring, or any other critical part is deemed necessary to be replaced during a repair the manufactures verification is required and justifiable.

Background Information

VR Stamp holders in almost all cases do not have direct access to the various manufactures spring charts to perform the verification. Spring charts are also revised over time, as a result determining the the correct spring chart can be difficult. Also acessing obsolete charts for valves built to previous editions is also a barrier to compliance. In many other situations, especially in the case of smaller PRVs (<2" & <500PSI) an existing spring might not be marked with permanent markings even when it was new (ie stamping) and any temporary marking usually in the form of paint colour codes used during initial assembly is no longer present.

Proposed Question

Is it the intent of 4.8.5.4 i) 3) that the "VR" Stamp is not permitted to be applied to any valve when the VR Certificate holder is unable to receive verification from the manufacturer that the existing spring is correct.

Proposed Reply

No

Committee's Question 1

Committee's Reply 1

Rationale

Committee's Question 2

Committee's Reply 2

PART 1

4.5 ~~PRESSURE RELIEF DEVICES~~OVERPRESSURE PROTECTION

See NBIC Part 1, 4.1 for the scope of pressure vessels covered by these requirements.

~~Pressure relief devices protecting pressure vessels shall meet the following requirements.~~When overpressure protection is provided by a pressure relief device or devices, the requirements in 4.5.1 through 4.5.6 apply. If overpressure protection is provided by Overpressure Protection by System Design in lieu of a pressure relief device or devices, the requirements in 4.5.7 apply.

~~4.5.7~~ OVERPRESSURE PROTECTION BY SYSTEM DESIGN

See NBIC Part 4, 2.5.8.

PART 2

2.3.5 INSPECTION OF PRESSURE VESSEL PARTS AND APPURTENANCES

2.3.5.2 SAFETY DEVICES

See NBIC Part 2, 2.5 for the inspection of safety devices (pressure relief valves and non-closing devices such as rupture disks) and NBIC Part 2, 2.6 for Overpressure Protection by System Design in lieu of a pressure relief device or devices used to prevent the overpressure of pressure vessels.

2.6 OVERPRESSURE PROTECTION BY SYSTEM DESIGN

See NBIC Part 4, 2.5.8.

PART 4

2.5 PRESSURE VESSEL ~~PRESSURE RELIEF DEVICES~~OVERPRESSURE PROTECTION

See NBIC Part 1, 4.1 for the scope of pressure vessels covered by the requirements of Part 4, 2.5.

When overpressure protection is provided by a pressure relief device or devices the requirements in 2.5.1 through 2.5.7 apply. If overpressure protection is provided by Overpressure Protection by System Design in lieu of a pressure relief device or devices, then the requirements in 2.5.8 apply.~~Pressure relief devices protecting pressure vessels shall meet the following requirements:~~

2.5.8 OVERPRESSURE PROTECTION BY SYSTEM DESIGN

Overpressure protection by system design may be used in lieu of a pressure relief device or devices if permitted by the Jurisdiction and the applicable Section of the ASME BPV Code. Compliance with the pressure vessel code requirements shall be documented in a report that includes as a minimum:

a) For pressure vessels for which the pressure is self-limiting
   1) The signature of the individual in responsible charge of the management of the operation of the vessel
   2) Detailed process and instrument flow diagrams, showing all pertinent elements of the system associated with the vessel
   3) A description of all operating and upset scenarios, including scenarios involving fire and those that result from operator error, and equipment and/or instrumentation malfunctions

4) An analysis showing the maximum coincident pressure and temperature that can result from each of the scenarios listed in item 3) above does not exceed the MAWP at that temperature
5) For a new vessel, a copy of the vessel's Manufacturer's data report stating that overpressure protection is provided by system design
6) For an existing vessel whose Manufacturer's data report does not state overpressure by system design, a copy of the Manufacturer's data report with an attachment signed by the user indicating that overpressure protection is being provided by system design.

b) For pressure vessels for which the pressure is not self-limiting
1) The signature of the individual in responsible charge of the management of the operation of the vessel
2) Detailed process and instrument flow diagrams (P&IDs), showing all pertinent elements of the system associated with the vessel
3) A description of all operating and upset scenarios, including those involving fire and those that result from operator error, and equipment and/or instrumentation malfunctions
4) A detailed description of any safety critical instrumentation used to limit the system pressure, including the identification of all truly independent redundancies and a reliability evaluation (qualitative or quantitative) of the overall safety system
5) An analysis showing the maximum pressure that can result from each of the scenarios
6) For a new vessel, a copy of the vessel's Manufacturer's data report stating that overpressure protection is provided by system design
7) For an existing vessel whose Manufacturer's data report does not state overpressure by system design, a copy of the Manufacturer's data report with an attachment signed by the user indicating that overpressure protection is being provided by system design.

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ACCREDITATION PROGRAMS

The National Board administers four specific accreditation programs as shown below:

"**R**".....Repairs and Alterations to Pressure-Retaining Items (NB-415)
"**VR**"… .....Repairs to Pressure Relief Valves and Pin Devices (NB-514)
"**NR**"… .....Repair and Replacement Activities for Nuclear Items (NB-417)
"**T/O**"… ....Testing of Pressure Relief Valves (NB-528)

The administrative requirements for the accreditation for these accreditation programs can be viewed on the National Board Website at www.nationalboard.org.

The National Board also administers accredits four specific inspection agency programs as shown below:

New Construction

National Board Acceptance of Authorized Inspection Agencies (AIA) *Accredited by the American Society of Mechanical Engineers* (ASME) (NB-360)

PART 4, SECTION 1
PRESSURE RELIEF DEVICES — GENERAL AND ADMINISTRATIVE REQUIREMENTS

1.1 SCOPE

This Part provides guidelines and requirements for the installation, in-service inspection and testing, and repairs of pressure relief devices.

1.2 CONSTRUCTION STANDARDS FOR PRESSURE RELIEF DEVICES

a) When the standard governing the original construction is the ASME Code, installation and repairs to pressure relief devices shall conform to the ASME Code section and edition most applicable to the work planned.

b) If the pressure relief device was not constructed to the ASME Code, then installation, inspection and repair shall wherever possible reference the original code of construction most applicable to the work.

c) If the pressure relief device was not constructed to any recognized construction code or standard, then installation, inspection, and repair shall reference a construction standard or specification most applicable to the work.

d) Where this is not possible or practicable, it is permissible to use other codes, standards, or specifications, including the ASME Code, provided there is concurrence of the Inspector (if applicable) and the Jurisdiction where the pressure relief device is installed.

1.3 PRESSURE RELIEF DEVICES — DEFINITIONS

Refer to Section 9, *Glossary* for definitions relating to pressure relief devices.

1.3.1 ADDITIONAL DEFINITIONS RELATING TO PRESSURE RELIEF DEVICES

Unless otherwise specified in the NBIC, the definitions relating to pressure relief devices in Section 2 of ASME PTC-25 shall apply.

1.4 ACCREDITATION

a) The National Board administers four specific accreditation programs:

"**R**" — Repairs and Alterations to Pressure-Retaining Items

"**VR**" — Repairs to Pressure Relief Valves and Pin Devices

"**NR**" — Repair and Replacement Activities for Nuclear Items

"**T/O**" — In-service Testing Only of Pressure Relief Valves

b) Organizations performing repairs and in-service testing to pressure relief valves shall be accredited as described in this section, as appropriate for the scope of work to be performed.

c) Organizations performing repairs and in-service testing to pressure relief valves outside the scope of the NBIC may be accredited and shall meet any additional requirements of the Jurisdiction where the work is performed.

1.4.1 ACCREDITATION PROCESS

a) The National Board administers accreditation programs for authorization of organizations performing repairs and in-service testing to pressure relief ~~valves.~~devices.

b) Any organization may apply to the National Board to obtain a *Certificate of Authorization* for a requested scope of activities. A review shall be conducted to evaluate the organization's Quality System. The individual assigned to conduct the evaluation shall meet the qualification requirements prescribed by the National Board. Upon completion of the evaluation, any deficiencies within the organization's Quality System will be documented and a recommendation will be made to the National Board regarding issuance of a *Certificate of Authorization*.

c) National Board procedures provide for the confidential review resulting in recommendations to issue or not issue a *Certificate of Authorization*.

d) The accreditation program provides requirements for organizations performing repairs and in-service testing to pressure relief ~~valves~~devices. Depending upon the expected scope of activities at the time of review, organizations may be authorized to perform repairs and in-service testing either in the shop only, field only, or shop and field. Repair and in-service testing activities shall be limited to the scope of work authorized.

e) Organizations desiring to renew or obtain a National Board *Certificate of Authorization* shall apply to the National Board using forms obtained from the National Board. Application for renewal shall be made prior to the expiration date of the *Certificate of Authorization*.

f) When an organization has shops in more than one location, the organization shall submit separate applications for each shop. The organization may perform repairs in its shop or in the field, provided such operations are described in the organization's Quality System.

2.4.5 PRESSURE RELIEF VALVES FOR TANKS AND HEAT EXCHANGERS

2.4.5.1 STEAM TO HOT-WATER SUPPLY

When a hot-water supply is heated indirectly by steam in a coil or pipe within the service limitations set forth in Part 1, 3.2*, Definitions*, the pressure of the steam used shall not exceed the safe working pressure of the hot water tank, and a pressure relief valve at least NPS 1 (DN 25), set to relieve at or below the maximum allowable working pressure of the tank, shall be applied on the tank.

2.4.5.2 HIGH TEMPERATURE WATER TO WATER HEAT EXCHANGER

When high temperature water is circulated through the coils or tubes of a heat exchanger to warm water for space heating or hot-water supply, within the service limitations set forth in Part 1, 3.2, *Definitions*, the heat exchanger shall be equipped with one or more National Board capacity certified pressure relief valves set to relieve at or below the maximum allowable working pressure of the heat exchanger, and of sufficient rated capacity to prevent the heat exchanger pressure from rising more than 10% above the maximum allowable working pressure of the vessel.

2.4.5.3 HIGH TEMPERATURE WATER TO STEAM HEAT EXCHANGER

When high temperature water is circulated through the coils or tubes of a heat exchanger to generate low pressure steam, within the service limitations set forth in Part 1, 3.2, *Definitions*, the heat exchanger shall be equipped with one or more National Board capacity certified pressure relief valves set to relieve at a pressure not to exceed 15 psig (100 kPa), and of sufficient rated capacity to prevent the heat exchanger pressure from rising more than 5 psig (34 kPa) above the maximum allowable working pressure of the vessel. For heat exchangers requiring steam pressures greater than 15 psig (100 kPa), refer to NBIC Part 1, Section 2 or Section 4.

2.5 PRESSURE VESSEL PRESSURE RELIEF DEVICES

See NBIC Part 1, 4.1 for the scope of pressure vessels covered by the requirements of Part 4, 2.5.

Pressure relief devices protecting pressure vessels shall meet the following requirements:

2.5.1 PRESSURE RELIEF DEVICE REQUIREMENTS

a) Pressure relief devices shall be manufactured in accordance with a national or international standard and be certified for capacity or flow resistance by the National Board.

b) Dead weight or weighted lever pressure relief ~~valves~~devices shall not be used.

c) An unfired steam boiler shall be equipped with pressure relief valves as required in NBIC Part 4, 2.2.

d) Pressure relief devices shall be selected (i.e., material, pressure, etc.) and installed such thattheir proper functioning will not be hindered by the nature of the vessel's contents.

2.5.2 NUMBER OF PRESSURE RELEIF DEVICES

At least one pressure relief device shall be provided for protection of a pressure vessel. Pressure vessels with multiple chambers with different maximum allowable working pressures shall have a pressure relief device to protect each chamber under the most severe coincident conditions.

3.2.2 INSPECTION REQUIREMENTS FOR DEVICE CONDITION

a) The ~~valve or~~ pressure relief device shall be checked for evidence that it is leaking or not sealing properly. Evidence of leakage through pressure-relief device ~~valves~~ may indicate that the system is being operated at a pressure
that is too close to the pressure relief device~~valve's~~ set pressure. (See Supplement 2 for guidance on the pressure differential between the pressure relief device~~valve~~ set pressure and system operating pressure.)

b) Seals for adjustments shall be intact and show no evidence of tampering.

c) Connecting bolting should be tight and all bolts intact.

d) The ~~valve or~~ pressure relief device should be examined for deposits or material buildup.

e) The ~~valve or~~ pressure relief device shall be checked for evidence of rust or corrosion.

f) The ~~valve or~~ pressure relief device shall be checked for damaged or misapplied parts.

g) If a drain hole is visible, the valve or device should be checked to ensure it is not clogged with debris or deposits.

h) The valve or device shall be checked for test gags left in place after pressure testing of the unit.

i) Bellows pressure relief device~~valves~~ shall be checked to ensure the bonnet vent is open or piped to a safe location. The vent shall not be plugged since this will cause the pressure relief device ~~valve~~ set pressure to be high if the bellows develops a leak. Leakage noted from the vent indicates the bellows is damaged and will no longer protect the valve from the effects of back pressure.

3.2.3 INSPECTION REQUIREMENTS FOR INSTALLATION CONDITION

a) Inlet piping shall be inspected to ensure it meets the requirements of the original code ofconstruction. For pressure relief device ~~valves~~, the inlet pipe shall be checked to ensure the inlet pipe size is not smaller than the device inlet size.

b) Discharge piping shall be inspected to ensure it meets the original code of construction. For pressure relief relief device ~~valves~~, the discharge pipe shall be checked to ensure the discharge pipe size is not smallerthan the device outlet size.

c) The pressure relief device ~~valve~~ drain piping shall be checked to ensure the piping is open.

d) The discharge piping shall be checked to ensure it drains properly.

e) The inlet and discharge piping shall be checked to ensure they are not binding or placing excessive stress on the pressure relief device ~~valve~~ body, which can lead to distortion of the pressure relief device ~~valve~~ body and leakage or malfunction.

f) The condition and adequacy of the pipe supports shall be inspected. Discharge piping should be supported independent of the device itself.

g) The pressure relief device ~~valve~~ discharge and discharge pipe shall be checked for possible hazards to personnel.

h) The installation shall be checked to ensure that there are no intervening isolation valves between the pressure source and the pressure relief device~~valve~~ inlet or between the valve outlet and its point of discharge. Isolation valves may be permitted in some pressure vessel service. (See 2.5.6 e)), and Jurisdictional require~~-~~ ments. Isolation valves shall not be used for power boilers, heating boilers, or water heaters.

i) A change-over valve, which is used to install two pressure relief devices on a single vessel location for the purpose of switching from one device to a spare device, is not considered a block valve if it is arranged such that there is no intermediate position that will isolate both pressure relief devices

8) Rupture disks are often used to isolate pressure relief valves from services where fouling or plugging of the valve inlet occurs. This tendency should be considered in establishing the inspection frequency.

9) Since rupture disks are non-reclosing devices, a visual inspection is the only inspection that can be performed. A rupture disk that is removed from its holder shall not be reinstalled unless recommended by the manufacturer. A rupture disk contained in an assembly that can be removed from a system without releasing the force maintaining the contact between the disk and holder, such as pre-torqued, welded, soldered, and some threaded assemblies, may be suitable for reinstallation after visual inspection. The manufacturer should be consulted for specific recommendations.

10) It is recommended that all rupture disks be periodically replaced to prevent unintended failure while in service due to deterioration of the device. Rupture disks should be carefully checked for damage prior to installation and handled by the disk edges, if possible. Any damage to the surface of the ruptured disk can affect the burst pressure.

3.2.5 TESTING AND OPERATIONAL INSPECTION OF PRESSURE RELIEF DEVICES

a) Pressure relief devices ~~valves~~ shall be tested periodically to ensure that they are free to operate and will operate in accordance with the requirements of the original code of construction. Testing should include device set or opening pressure, reclosing pressure, where applicable, and seat leakage evaluation. Tolerances specified for these operating requirements in the original code of construction shall be used to deter- mine the acceptability of test resul ts.

b) Testing may be accomplished by the owner on the unit where the valve is installed or at a qualified test facility. In many cases, testing on the unit may be impractical, especially if the service fluid is hazardous or toxic. Testing on the unit may involve the bypassing of operating controls and should only be performed by qualified individuals under carefully controlled conditions. It is recommended that a written procedure be available to conduct this testing.

1) The Inspector should ensure that calibrated equipment has been used to perform this test and the results should be documented by the owner.

2) If the testing was performed at a test facility, the record of this test should be reviewed to ensurethe valve meets the requirements of the original code of construction. Valves which have been in toxic, flammable, or other hazardous services shall be carefully decontaminated before being tested. In particular, the closed bonnet of valves in these services may contain fluids that are not easily removed or neutralized. If a test cannot be safely performed, the valve shall be disassembled, cleaned, and decontaminated, repaired, and reset.

3) If a valve has been removed for testing, the inlet and outlet connections should be checked for blockage by product buildup or corrosion.

c) Valves may be tested using lift assist devices when testing at full pressure may cause damage to the valve being tested, or it is impractical to test at full pressure due to system design considerations. Lift assist devices apply an auxiliary load to the valve spindle or stem, and using the measured inlet pressure, applied load and other valve data allow the set pressure to be calculated. If a lift assist device is used to determine valve set pressure, the conditions of 4.6.3 shall be met. It should be noted that false set pressure readings may be obtained for valves which are leaking excessively or otherwise damaged.

d) If valves are not tested on the system using the system fluid, the following test mediums shall beused:

1) High pressure boiler pressure relief valves, high temperature hot-water boiler pressure relief valves, low pressure steam heating boilers: steam;

2) Hot-water heating boiler pressure relief valves: steam, air, or water;

2) Pressure of 400 psig (2.76 MPa) or greater: Set pressure test to verify nameplate set pressure every three years or as determined by operating experience as verified by testing history.

3) Set pressure tests should be performed prior to bringing the boiler down for planned internal inspection so needed repairs or adjustments can be made while the boiler is down.

b) High-Temperature Hot-Water Boilers

Set pressure test annually to verify nameplate set pressure or as determined by operating experience as verified by testing history. For safety reasons, removal and testing on a steam test bench is recommended. Such testing will avoid damaging the pressure relief valve by discharge of a steam water mixture, which could occur if the valve is tested in place.

c) Organic Fluid Vaporizers

Pressure relief valves shall be disconnected from the vaporizer at least once yearly, when they shall be inspected, tested, repaired if necessary, and then replaced on the vaporizer.

d) Low-Pressure Steam Heating Boilers

Manual check quarterly; set pressure test annually prior to steam heating season to verify nameplate set pressure.

e) Hot-Water Heating Boilers

Manual check quarterly; pressure test annually prior to heating season to verify nameplate set pressure.

Note: The frequencies specified for the testing of pressure relief valves on boilers is primarily based on differences between high pressure boilers that are continuously manned, and lower pressure automatically controlled boilers that are not monitored by a boiler operator at all times. When any boiler experiences an overpressure condition such that the pressure relief valves actuate, the valves should be inspected for seat leakage and other damage as soon as possible and any deficiencies corrected.

f) Water Heaters

Manual check every two months, or as determined based upon inspection history and manufacturer recommendations. Every 3 years, remove temperature and pressure relief valve to inspect temperature probe for damage, buildup, or corrosion. The temperature probe shall be checked for the condition of the coating material and freedom of movement without detaching. If the probe pulls out or falls off during inspection, the valve shall be repaired or replaced. Due to the relatively low cost of temperature and pressure relief valves for this service, it is recommended that a defective valve be replaced with a new valve if a repair or resetting is indicated.

g) Pressure Vessels and Piping

Frequency of test and inspection of pressure relief devices for pressure vessel and piping service is greatly dependent on the nature of the contents, external environment, and operation of the system, therefore only general recommendations can be given. Inspection frequency should be based on previous inspection history. If, during inspection, pressure relief devices ~~valves~~ are found to be defective or damaged, intervals should be shortened until acceptable inspection results are obtained. Where test records and/or inspec- tion history are not available, the following inspection and test frequencies are suggested:

Service	Inspection Frequency
Steam	Annual
Air and Clean Dry Gases	Every three years
Pressure relief valves in combination with rupture disks	Every five years
Propane, Refrigerant	Every five years
All Others	Per inspection history

3.2.6.1 ESTABLISHMENT OF INSPECTION AND TEST INTERVALS

Where a recommended test frequency is notlisted, the pressure relief device~~valve~~ user and Inspector must determine and
agree on a suitable interval for inspection and test. Some items to be considered in making this determination are: b)

a) Jurisdictional requirements;

b) Records of test data and inspections from similar processes and similar devices in operation at that facility;

c) Recommendations from the device manufacturer. In particular, when the pressure relief device~~valve~~ includes non-metallic
parts such as a diaphragm or soft seat, periodic replacement of those parts may be specified;

d) Operating history of the system. Systems with frequent upsets where a pressure relief device~~valve~~ has actuated requiremore frequent inspection;

e) Results of visual inspection of the device and installation conditions. Signs of pressure relief device~~valve~~ leakage, corrosion or damaged parts all indicate more frequent operational inspections;

f) ~~***Installation of a pressure relief device valve in a system with a common discharge header.~~ Pressure relief devices~~Valves~~ discharging into a common collection pipe may be affected by the discharge of other devices, ~~valves~~ by the corrosion of parts in the outlet portion of the devices, ~~valve~~ or the buildup of products discharged from those devices. ~~valves~~;**

g) Ability to coordinate with planned system shutdowns. The shutdown of a system for other maintenance or inspection activities is an ideal time for the operational inspection and test of a pressure relief device~~valve~~;

h) Critical nature of the system. Systems that are critical to plant operation or where the effects of the discharge of fluids from the system are particularly detrimental due to fire hazard, environmental damage, or toxicity concerns all call for more frequent inspection intervals to ensure devices are operating properly; and

i) Where the effects of corrosion, blockage by system fluid, or ability of the pressure relief device ~~valve~~ to operate under given service conditions are unknown (such as in a new process or installation), a relatively short inspection interval, not to exceed one year or the first planned shutdown, whichever is shorter, shall be estab- lished. At that time the pressure relief device shall be visually inspected and tested. If unacceptable test results are obtained, the inspection interval shall be reduced by 50% until suitable results are obtained.

3.2.6.2 ESTABLISHMENT OF SERVICE INTERVALS

a) The above intervals are guidelines for periodic inspection and testing. Typically if there are no adverse findings, a pressure relief device~~valve~~ would be placed back in service until the next inspection. Any unaccept- able conditions that are found by the inspection shall be corrected immediately by repair or replacement of the device. Many users will maintain spare pressure relief devices so the process or

system is not affected by excessive downtime.

PART 4, SECTION 4
PRESSURE RELIEF DEVICES — REPAIR OF PRESSURE RELIEF DEVICESVALVES

4.1 SCOPE

This section provides requirements and guidelines that apply to repairs to pressure relief devices valves.

a) Repairs may be required because of defects found during periodic inspection, testing, operation, or maintenance. Since pressure relief devices are provided for safety and the protection of personnel and property, repairs are often regulated by the Jurisdiction where the pressure relief device is installed. The Jurisdiction should be contacted for their specific requirements.

b) This section describes some of the administrative requirements for the accreditation of repair organizations. Additional administrative requirements can be found in NB-514, A*ccreditation of "VR" Repair Organizations*. Some Jurisdictions may independently administer a program of authorization for organizations to perform repairs within that Jurisdiction.

c) Requirements for repairs and alterations to pressure-retaining items and repair and replacement activities for nuclear items can be found in NBIC Part 3.

4.2 GENERAL REQUIREMENTS

a) Repair of a pressure relief devicevalve is considered to include the disassembly, replacement, remachining, or cleaning of any critical part, lapping of a seat and disc, replace o-ring and seals reassembly, adjustment, testing, or any other operation that may affect the flow passage, capacity, function, or pressure-retaining integrity.

b) Conversions, changes, or adjustments (excluding those as defined in 3.2.5.2 a) or Part 2 Paragraph 2.5.7.2.a)) affecting critical parts are also considered repairs. The scope of conversions may include changes in service fluid and changes such as bellows, soft seats, and other changes that may affect Type/Model number provided such changes are recorded on the document as required for a quality system and the repair nameplate. (See 4.7.1)

c) The scope of repair activities shall not include changes in ASME Code status.

4.2.1 "VR" REPAIR

a) When a repair is being performed under the administrative requirements for National Board Accreditation, a repair shall consist of the following operations as a minimum:

1) Complete disassembly, cleaning, and inspection of parts, repair or replacement of parts found to be defective, reassembly, testing as required by 4.6, sealing and application of a repair nameplate. When completed, the pressure relief devicevalve's condition and performance shall be equivalent to the standards for new valves.

2) The administrative requirements for National Board Accreditation apply only to valves that are marked with the ASME Certification Mark and the "V", "UV", "UD" "HV", or "NV" Designator or the sup- planted ASME "V", "UV", "UD" "HV" or "NV" Code symbol and have been capacity certified on the applicable fluid by the National Board.

4.2.2 CONSTRUCTION STANDARDS FOR PRESSURE RELIEF DEVICES

For pressure relief devices, the applicable new construction standard to be used for reference during repairs is the ASME Code. ASME Code Cases shall be used for repairs when they were used in the original

construction of the valve. ASME Code Cases may be used when they have been accepted for use by the NBIC Committee and the Jurisdiction where the pressure-retaining item is installed.

a) For pressure relief devices, the Code Case number shall be noted on the repair document and, when required by the code case, stamped on the repair nameplate.

b) The Jurisdiction where the pressure retaining item is installed shall be consulted for any unique requirements it may have established.

4.2.3 INSTALLATION OF PRESSURE RELIEF DEVICES

Installation of a pressure relief device by mechanical methods is not considered to be a repair, as long as no changes or adjustments are made to the device. Seals installed by the device manufacturer or repair organization shall not be removed when the device is installed.

When a pressure relief device is to be installed by welding on an existing pressure retaining item, the requirements of Part 3 of the NBIC for welded repairs shall be followed.

If a pressure relief device ~~valve~~ must be disassembled or its adjustments changed as part of the installation process, the reassembly, resetting, retesting or other such activities shall be done by a qualified organization which meets the requirements of NBIC Part 4. For a new pressure relief device~~valve~~, the original device~~valve~~ manufacturer shall perform this activity as required by the original code of construction.

The installation of a non-reclosing pressure relief device or the replaceable element of a non-reclosing pressure relief device such as a rupture disk or pin is not considered to be a repair. The manufacturer's procedures and instruction shall be followed for the installation of these devices.

4.2.4 INITIAL ADJUSTMENTS TO PRESSURE RELIEF DEVICES ~~VALVES~~

The initial installation testing and adjustments of a new pressure relief device~~valve~~ on a boiler or pressure vessel are not considered a repair if made by the manufacturer or assembler of the pressure relief device~~valve~~.

4.3 MATERIALS FOR PRESSURE RELIEF DEVICE~~VALVE~~ REPAIR

The materials used in making repairs shall conform to the requirements of the original code of construction. The "VR" Certificate Holder is responsible for verifying identification of existing materials from original data, drawings, or unit records and identification of the materials to be installed.

4.3.1 REPLACEMENT PARTS FOR PRESSURE RELIEF DEVICES

a) Critical parts shall be fabricated by the pressure relief device ~~valve~~ manufacturer or to the manufacturer's specifications. Critical parts are those that may affect the valve flow passage, capacity, function, or pressure-retaining integrity.

b) Critical parts not fabricated by the pressure relief device~~valve~~ manufacturer shall be supplied with material test certification
for the material used to fabricate the part.

c) Replacement critical parts receiving records shall be attached or be traceable to the pressure relief device~~valve~~ repair docu- ment (see 4.8.5.4 i)).These records shall conform to at least one of the following.

1) Receiving records documenting the shipping origin of the part fabricated by the relief device~~valve~~ manufacturer (such as packing list) from the pressure relief device ~~valve~~ manufacturer or assembler of the pressure relief device~~valve~~ type.

2) A document prepared by the "VR" Certificate Holder certifying that the replacement part used in the repair has the manufacturer's identification on the part or is otherwise labeled or tagged by the

manufacturer and meets the manufacturer's acceptance criteria (e.g., critical dimensions found in maintenance manual).

3) Receiving records for replacement critical parts obtained from a source other than the pressure relief device~~valve~~ manu- facturer or assembler of the pressure relief device ~~valve~~ type shall include a document that provides as a minimum:

a. The part manufacturer and part designation.

b. A certifying statement that either:

1. The part was fabricated by the pressure relief device~~valve~~ manufacturer and meets the manufacturer's accep- tance criteria (e.g., critical dimensions found in maintenance manual), or

2. The part meets the manufacturer's specifications and was fabricated from material as identified by the attached material test report.

c. The signature of an authorized individual of the part source.

d. The name and address of the part source for whom the authorized individual is signing.

d) Material for bolting shall meet the manufacturer's specification, but does not require material test certification if marked as required by the material specification.

4.4 WELDING FOR PRESSURE RELIEF DEVICE~~VALVES~~

When welding is used as a repair technique during a pressure relief device~~valve~~ repair, the following requirements shall apply.

a) Welding shall be performed in accordance with the requirements of the original code of construction used for the pressure relief device~~valve~~.

b) Cast iron and carbon or alloy steel having a carbon content of more than 0.35% shall not be welded.

c) Defects in pressure relief device~~valve~~ parts such as cracks, pits, or corrosion that will be repaired by welding shall be completely removed before the weld repair of the part is performed. Removal of the defect shall be verified by suitable NDE as required.

d) Consideration shall be given to the condition of the existing material, especially in the weld preparation area.

4.4.1 WELDING PROCEDURE SPECIFICATIONS

Welding shall be performed in accordance with Welding Procedure Specifications (WPS) qualified in accordance with the original code of construction. When this is not possible or practicable, the WPS may be qualified in accordance with Section IX of the ASME Code.

4.4.2 STANDARD WELDING PROCEDURE SPECIFICATIONS

A "VR" Certificate Holder may use one or more applicable Standard Welding Procedure Specifications shown in NBIC Part 3, 2.3.

4.4.3 PERFORMANCE QUALIFICATION

Welders or welding operators shall be qualified for the welding processes that are used. Such qualification shall be in accordance with the requirements of the original code of construction or Section IX of the ASME Code.

4.4.4 WELDING RECORDS

The "VR" Certificate Holder shall maintain a record of the results obtained in welding procedure qualifications, except for those qualifications for which the provisions of 4.4.2 are used, and of the results obtained in welding performance qualifications. These records shall be certified by the "VR" Certificate Holder and shall be available to the National Board.

4.4.5 WELDER'S IDENTIFICATION

The "VR" Certificate Holder shall establish a system for the assignment of a unique identification mark to each welder/welding operator qualified in accordance with the requirements of the NBIC. The "VR" Certificate Holder shall also establish a written procedure whereby welded joints can be identified as to the welder or welding operator who made them. This procedure shall use one or more of the following methods and shall be described in the quality control system written description. The welder's or welding operator's identifica- tion mark may be stamped (low stress stamp) adjacent to welded joints made by the individual, or the "VR" Certificate Holder may keep a documented record of welded joints and the welders or welding operators used in making the joints.

4.4.6 WELDER'S CONTINUITY

The performance qualification of a welder or welding operator shall be affected when one of the following conditions occur:

a) When the welder or welding operator has not welded using a specific process during a period of six months or more, their qualifications for that process shall expire.

b) When there is specific reason to question their ability to make welds that meet the specification, the qualification that supports the welding that is being performed shall be revoked. All other qualifications not questioned remain in effect.

4.4.7 WELD REPAIRS TO PRESSURE RELIEF DEVICE~~VALVE~~ PARTS BY AN "R" STAMP HOLDER

a) The quality system manual may include controls for the "VR" Certificate Holder to have the pressure relief valve part repaired by a National Board "R" Certificate Holder, per this section provided the following documentation is provided to the "R" Certificate Holder:

   1) Code of construction, year built;

   2) Part identification;

   3) Part material specified; and

   4) "VR" Certificate Holder's unique identifier for traceability as required by the repair inspection program.

b) Prior to performing weld repairs to pressure relief device~~valve (PRV)~~ parts, the "R" Certificate Holder shall receive repair information required by 4.4.7 a) from the "VR" Certificate Holder responsible for the pres- sure relief device~~valve~~ repair.

   1) Pressure relief device~~PRV~~ part weld repairs shall be performed under the "R" Certificate Holder's quality system; how- ever, the requirements for in-process involvement of the Inspector (see Part 3, 2.2.2) may be waived. The requirement for stamping is waived.

   2) The process of identifying and controlling repairs shall be documented in the "R" Certificate Holder's quality system.

3) Pressure relief device~~PRV~~ part repairs shall be documented on a Form R-1 with a statement under the "Remarks" section Pressure Relief Device~~"PRV~~ Part Repair." The owner's name and location of installation shall be that of the "VR" Certificate Holder. The information received from the "VR" Certificate Holder as required in 4.4.7 a) shall be noted under the "Description of Work" section.

4) Upon completion of the repair, the repaired part and completed Form R-1 shall be returned to the "VR" Certificate Holder responsible for completing the Pressure Relief Device ~~PRV~~ repair.

4.5 HEAT TREATMENT

4.5.1 PREHEATING

Preheating may be employed during welding to assist in completion of the welded joint in accordance with NBIC Part 3, 2.5.1. The need for and the temperature of preheat are dependent on a number of factors, such as chemical analysis, degree of restraint of the items being joined, material thickness, and mechanical properties. The welding procedure specification for the material being welded shall specify the preheat temperature requirements.

4.5.2 POSTWELD HEAT TREATMENT

Postweld heat treatment shall be performed as required by the original code of construction in accordance with a written procedure. The procedure shall contain the parameters for postweld heat treatment. A time and temperature report or temperature record shall be maintained to document the work performed.

4.6 PRESSURE RELIEF DEVICE~~VALVE~~ PERFORMANCE TESTING AND TESTING EQUIPMENT

Each pressure relief device~~valve~~ to which the "VR" repair symbol stamp is to be applied shall be subjected to the following tests by the repair Certificate Holder.

4.6.1 TEST MEDIUM AND TESTING EQUIPMENT

Pressure relief devices~~Valves~~ marked for steam service, or having special internal parts for steam service, shall be tested on steam. Pressure relief devices~~Valves~~ marked for air, gas, or vapor service shall be tested with air or gas. Valves marked for liquid service shall be tested with water or other suitable liquid. ASME Code, Section IV hot-water pressure relief devices~~valves,~~ shall be tested on water, steam, or air.

a) Each pressure relief device~~valve~~ shall be tested to demonstrate the following:

1) Set pressure (as defined by the pressure relief device~~valve~~ manufacturer and as listed in NB-18, *Pressure Relief Device Certifications);*

2) Response to blowdown, when required by the original code of construction;

3) Seat tightness; and

4) For pressure relief devices~~valves~~ designed to discharge to a closed system, the tightness of the secondary pressure zone shall be tested as required by the original code of construction.

b) The equipment used for the performance testing prescribed above shall meet the following requirements:

1) The performance testing equipment shall include a pressure vessel of adequate volume and pressure source capacity to ensure compliance with 4.6.1 a) 1);

2) Prior to use, all performance testing equipment shall be qualified by the Certificate Holder to ensure that the equipment and testing procedures will provide accurate results when used within the ranges established for that equipment. This qualification may be accomplished by benchmark testing, comparisons to equipment used for verification testing as specified in the quality system, or comparisons to field performance. This qualification shall be documented. Documentation of this qualification shall be retained in accordance with Table 4.8.5.4 s). Documentation of this qualification shall include but not be limited to:

   a. Schematic of the performance test equipment;

   b. Size and pressure ranges of pressure relief devices~~valves~~ to be tested and the test fluid to be used;

   c. Dimensions of test vessels;

   d. Accuracy of pressure measuring equipment;

   e. Size and design type of valves used to control flow; and

   f. Method of qualifying.

3) Prior to the implementation of any addition or modification to the testing equipment that would alter the contents of the document required in 4.6.1 b) 2), the Certificate Holder shall re-qualify the performance test equipment in accordance with 4.6.1 b) 2). If the equipment changed was used to satisfy the requirements of verification testing, the Certificate Holder shall notify the National Board and additional verification testing, in accordance with the quality system, may be required.

4.6.2 OWNER-USER ASME CODE SECTION VIII STEAM TESTING

When ASME Code Section VIII pressure relief devices~~valves~~ are repaired by the owner for the owner's own use, pressure relief devices~~valves~~ for steam service may be tested on air for set pressure and, if possible, blowdown adjustment, provided the pressure relief device~~valve~~ man- ufacturer's corrections for differential in set pressure between steam and air are applied to the set pressure.

4.6.3 LIFT ASSIST TESTING

a) A device may be used to apply an auxiliary lifting load on the spring of a repaired pressure relief-valve to establish the set pressure in lieu of the tests required in 4.6.1 a) 1) when such testing at full pressure:

   1) May cause damage to the valve being tested; or

   2) Is impractical when system design considerations preclude testing at full pressure.

b) While actual valve blowdown and valve performance characteristics cannot be verified using this testing technique,-valve set pressure may be determined to an acceptable degree of accuracy if, as a mini- mum:

   1) Equipment utilized is calibrated as required in the quality system; including, but not limited to:

      a. System pressure measurement equipment;

      b. Lifting force measurement equipment; and

      c. Other measuring elements required by the device manufacturer.

   2) the device and test procedures that have proved to give accurate results are used and followed;

   3) A static inlet pressure is applied with the test medium specified in 4.6.1; and

4) Adjustments are made in accordance with the valve manufacturer's recommendations to ensure proper lift and blowdown.

c) Prior to use, all lift assist devices shall be qualified by the Certificate Holder to ensure that the equipment and testing procedures will provide accurate results when used within the ranges established for that equipment used for verification testing as specified in the quality system or comparisons to field performance. This qualification shall be documented and provisions made to retain such documentation in accordance with Table 4.8.5.4 s). Documentation of this qualification shall include but not be limited to:

1) A description of the lift assist device including model number, serial number and manufacturer;

2) Size and pressure ranges of valves to be tested with the lift assist device and the test fluid to be used;

Note: Maximum set pressure is determined by available lift force and system pressure.

3) Accuracy of pressure measuring equipment; and

4) Method of qualifying.

d) After initial qualification of the device the device shall be re-qualified if:

1) Modifications or repairs to the device are made which would affect test results; or

2) The manufacturer issues a mandatory recall or modification to the device which will affect test results.

4.6.4 PRESSURE TEST OF PARTS

a) Parts used in repaired pressure relief devices ~~valves~~ shall be pressure tested and documentation provided according to the following categories:

1) Replacement Parts

The "VR" Certificate Holder is responsible for documentation that the appropriate pressure test has been completed as required by the original code of construction.

2) Parts Repaired by Welding

These parts shall be subjected to a pressure test required by the original code of construction. The "VR" Certificate Holder shall be responsible for documentation of such test.

b) Parts repaired by re-machining within part specifications, lapping, or polishing do not require a pressure test.

4.7 STAMPING REQUIREMENTS FOR PRESSURE RELIEF DEVICES

4.7.1 NAMEPLATES

Proper marking and identification of tested or repaired pressure relief devices ~~valves~~ is critical to ensuring acceptance during subsequent inspections, and also provide for traceability and identification of any changes made to the pressure relief device ~~valve~~. All operations that require the pressure relief device's ~~valve's~~ seals to be replaced shall be identified by a nameplate as described in 4.7.2 or 4.7.4.

(19) 4.7.2 REPAIR NAMEPLATE

When a pressure relief device ~~valve~~ is repaired, a metal repair nameplate stamped with the information required below shall be securely attached to the device ~~valve~~ adjacent to the original manufacturer's stamping or nameplate. If not installed directly on the pressure relief device ~~valve~~, the nameplate shall be securely attached to the device ~~valve~~ independent of the external adjustment seals in a manner that does not interfere with device~~valve~~ operation and sealed in accordance with the quality system.

a) Prior to attachment of the repair nameplate, the previous repair nameplate, if applicable, shall be removed from the repaired valve.

b) As a minimum, the information on the pressure relief device~~valve~~ repair nameplate (see Figure 4.7.2-a) shall include:

1) The name of the repair organization preceded by the words "repaired by";

2) The "VR" repair symbol stamp and the "VR" certificate number;

3) Unique identifier (e.g., repair serial number, shop order number, etc.);

4) Date of repair;

5) Set pressure;

6) Capacity and capacity units (if changed from original nameplate due to set pressure or service fluid change);

7) Type/Model number (if changed from original nameplate by a conversion. See 4.2); and

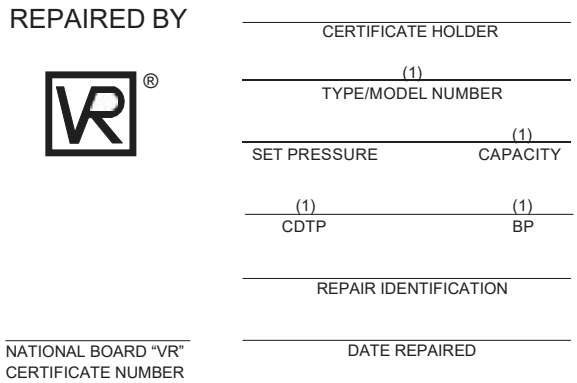
8) When an adjustment is made to correct for service conditions of superimposed back pressure and/or temperature or the differential between popping pressure between steam and air (see 4.6.2), the information on the valve repair nameplate shall include the:

a. Cold Differential Test Pressure (CDTP); and

b. Superimposed Back Pressure (BP) (only when applicable).

FIGURE 4.7.2-a

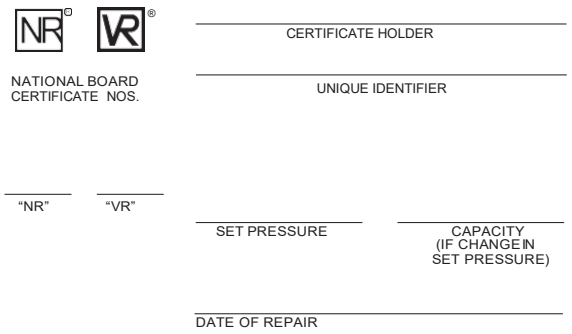
REQUIRED MARKINGS FOR REPAIR OF ASME/NATIONAL BOARD "V," "UV,", " UD" AND "HV"-STAMPED PRESSURE RELIEF DEVICES ~~VALVES~~



Note:. To be indicated only when changed.

FIGURE 4.7.2-b

REQUIRED MARKINGS FOR REPAIR OF NUCLEAR PRESSURE RELIEF DEVICES~~VALVES~~



4.7.3 CHANGES TO ORIGINAL PRESSURE RELIEF DEVICE~~VALVE~~ NAMEPLATE INFORMATION

a) If the set pressure is changed, the set pressure, capacity, and blowdown, if applicable, on the original nameplate or stamping shall be marked out but left legible. The new capacity shall be based on that for which the pressure relief device~~valve~~ was originally certified.

b) If the service fluid is changed, the capacity, including units, on the original nameplate or stamping shall be marked out but left legible. The new capacity shall be based on that for which the pressure relief device~~valve~~ was origi- nally certified, or if a conversion has been made, as described in 4.2 on the capacity certification for the pressure relief device ~~valve~~ as converted.

c) If the Type/Model number is changed, the Type/Model number on the original nameplate or stamping shall be marked out but left legible.

d) If the blowdown is changed, the blowdown, if shown on the original nameplate or stamping, shall be marked out but left legible. The new blowdown may be based on the current ASME Code requirements.

e) Repair organizations shall verify the Type/Model number, inlet size, set pressure, and capacity on the original nameplate or stamping that is not marked out. Incorrect information on the original manufacturer's nameplate or stamping shall be marked out but left legible. Corrected information shall be indicated on the repair nameplate and noted on the document as required by the quality system.

4.7.4 REPLACEMENT OF ILLEGIBLE OR MISSING NAMEPLATES

a) Illegible Nameplates

When the information on the original manufacturer's or assembler's nameplate or stamping is illegible, but traceability can be confirmed, the nameplate or stamping shall be augmented by a nameplate furnished by the "VR" stamp holder stamped "Duplicate." It shall contain all information that originally appeared on the nameplate or pressure relief device ~~valve~~, as required by the applicable section of the ASME Code, except the "V," "HV," " UD" or "UV" symbol and the National Board mark. The repair organization's nameplate, with the "VR" stamp and other required data specified in 4.7.2, will make the repairer responsible to the owner and the Jurisdiction that the information on the duplicate nameplate is correct.

b) Missing Nameplates

When the original valve nameplate is missing, the repair organization is not authorized to perform repairs to the valve under the "VR" program, unless positive identification can be made to that specific valve and verification that the pressure relief device ~~valve~~ was originally stamped with an ASME "V" ~~,or~~ UV", " UD" symbol or marked with an ASME "HV" symbol. Valves that can be positively identified shall be equipped with a duplicate nameplate,

as described in this section, in addition to the repairer's "VR"-stamped nameplate. The repairer's responsibilities for accurate data, as defined in 4.7.5 a) shall apply.

c) Marking of Original Code Stamp

When a duplicate nameplate is affixed to a pressure relief device~~valve~~, as required by this section, it shall be marked "Sec. I," "Sec. IV," or "Sec. VIII," as applicable, to indicate the original ASME Code stamping.

(19) 4.7.5 REPLACEMENT OF ILLEGIBLE OR MISSING NAMEPLATES

a) Illegible Nameplates

When the information on the original manufacturer's or assembler's nameplate or stamping is illegi- ble, but traceability can be confirmed, the nameplate or stamping shall be augmented by a nameplate furnished by the "VR" stamp holder stamped "Duplicate." It shall contain all information that originally appeared on the nameplate or valve, as required by the applicable section of the ASME Code, except the ASME Certification Mark and the "V", "UV", UD or "HV" Designator or the supplanted "V", "UV",UD or "HV" symbol and the National Board mark. The repair organization's nameplate, with the "VR" stamp and other required data specified in 4.7.2, will make the repairer responsible to the owner and the Jurisdiction that the information on the duplicate nameplate is correct.

b) Missing Nameplates

When the original valve nameplate is missing, the repair organization is not authorized to perform repairs to the valve under the "VR" program, unless positive identification can be made to that specific valve and verification that the valve was originally marked with the ASME Certification Mark and the "V", "UV", or "HV" Designator or the supplanted ASME "V" , "UV" or "HV" symbol. Valves that can be positively identified shall be equipped with a duplicate nameplate, as described in this section, in addition to the repairer's "VR"-stamped nameplate. The repairer's responsibilities for accurate data, as defined in 4.7.5(a) (Illegible Nameplates), shall apply.

c) Marking of Original Code Stamp

When a duplicate nameplate is affixed to a valve, as required by this section, it shall be marked "Sec. I", "Sec. IV", or "Sec. VIII", as applicable, to indicate the original ASME Code marking.

4.8 ACCREDITATION OF "VR" REPAIR ORGANIZATIONS

4.8.1 SCOPE

a) This section provides requirements that must be met for an organization to obtain a National Board *Certificate of Authorization* to use the "VR" Symbol Stamp for repair activities of pressure relief devices constructed in accordance with the requirements of the ASME Code.

b) For administrative requirements to obtain or renew a National Board "VR" *Certificate of Authorization* and "VR" Symbol Stamp, refer to NB-514, *Accreditation of "VR" Repair Organizations*.

4.8.2 JURISDICTIONAL PARTICIPATION

The National Board member Jurisdiction in which the "VR" organization is located is encouraged to participate in the review and demonstration of the applicant's quality system. The Jurisdiction may require participation in the review of the repair organization and the demonstration and acceptance of the repair organization's quality system manual.

4.8.3 ISSUANCE AND RENEWAL OF THE "VR" *CERTIFICATE OF AUTHORIZATION*

4.8.3.1 GENERAL

Authorization to use the stamp bearing the official National Board "VR" symbol as shown in Figure 4.7.2-a, will be granted by the National Board pursuant to the provisions of the following administrative rules and procedures.

4.8.3.2 ISSUANCE OF CERTIFICATE

Repair organizations, manufacturers, assemblers, or users that make repairs to the ASME Code symbol stamped or marked pressure relief devices~~valves~~ and National Board capacity certified pressure relief devices~~valves~~ may apply to the National Board for a *Certificate of Authorization* to use the "VR" symbol.

4.8.4 USE OF THE "VR" *CERTIFICATE OF AUTHORIZATION*

4.8.4.1 TECHNICAL REQUIREMENTS

The administrative requirements of 4.8 for use of the "VR" stamp shall be used in conjunction with the technical requirements for valve repair as described in sections 4.1 through 4.7. Those requirements shall be mandatory when a "VR" repair is performed.

4.8.4.2 STAMP USE

Each "VR" symbol stamp shall be used only by the repair firm within the scope, limitations, and restrictions under which it was issued.

4.8.5 QUALITY SYSTEM

4.8.5.1 GENERAL

Each applicant for a new or renewed "VR" *Certificate of Authorization* shall have and maintain a quality system which shall establish that all of these rules and administrative procedures and applicable ASME Code requirements, including material control, fabrication, machining, welding, examination, setting, testing, inspection, sealing, and stamping will be met.

4.8.5.2 WRITTEN DESCRIPTION

A written description, in the English language, of the system the applicant will use shall be available for review and shall contain, as a minimum, the features set forth in 4.8.5.4. This description may be brief or voluminous, depending upon the projected scope of work, and shall be treated confidentially. In general, the quality system shall describe and explain what documents and procedures the repair firm will use to validate a valve repair.

4.8.5.3 MAINTENANCE OF CONTROLLED COPY

Each applicant to whom a "VR" *Certificate of Authorization* is issued shall maintain thereafter a controlled copy of the accepted quality system manual with the National Board. Except for changes that do not affect the quality system, revisions to the quality system manual shall not be implemented until such revisions are accepted by the National Board.

(19) 4.8.5.4 OUTLINE OF REQUIREMENTS FOR A QUALITY SYSTEM

The following establishes the minimum requirements of the written description of the quality system. It is required that each valve repair organization develop its own quality system that meets the requirements of its organization. For this reason it is not possible to develop one quality system that could apply to more than one organization. The written description shall include, as a minimum, the following features:

a) Title Page

The title page shall include the name and address of the company to which the National Board *Certificate of Authorization* is to be issued.

b) Revision Log

A revision log shall be included to ensure revision control of the quality system manual. The log should contain sufficient space for date, description and section of revision, company approval, and National Board acceptance.

c) Contents Page

The contents page shall list and reference, by paragraph and page number, the subjects and exhibits contained therein.

d) Statement of Authority and Responsibility

A statement of authority and responsibility shall be dated and signed by an officer of the company. It shall include:

1) A statement that the "VR" stamp shall be applied only to pressure relief devices~~valves~~ that meet both of the following conditions:

a. Are marked with the ASME Certification Mark and the "V", "UV", "HV", UD" or "NV" Designator or the supplanted ASME "V", "UV", "HV" or "NV" Code symbol and have been capacity certified by the National Board; and

b. Have been disassembled, inspected, and repaired by the Certificate Holder such that the pressure relief devices~~valves'~~ condition and performance are equivalent to the standards for new pressure relief devices ~~valves~~.

2) The title of the individual responsible to ensure that the quality system is followed and who has authority and freedom to effect the responsibility;

3) A statement that if there is a disagreement in the implementation of the written quality system, the matter is to be referred to a higher authority in the company for resolution; and

4) The title of the individual authorized to approve revisions to the written quality system and the method by which such revisions are to be submitted to the National Board for acceptance before implementation.

e) Organization Chart

A chart showing the relationship between management, purchasing, repairing, inspection, and quality control personnel shall be included and shall reflect the actual organization in place.

f) Scope of Work

1) The scope of work section shall indicate the scope and type of valve repairs, including conversions the organization is capable of and intends to perform. The location of repairs (shop, shop and field, or field only), ASME Code Section(s) to which the repairs apply, the test medium (air, gas, liquid, or

steam, or combinations thereof), and special processes (machining, welding, postweld heat treatment, or nondestructive examination, or combinations thereof) shall be specifically addressed.

2) The types and sizes of valves to be repaired, pressure ranges and other limitations, such as engineering and test facilities, should also be addressed.

g) Drawings and Specification Control

The drawings and specification control system shall provide procedures assuring that the latest applicable drawings, specifications, and instructions required are used for valve repair, including conversions, inspection, and testing.

h) Material and Part Control

The material and part control section shall describe purchasing, receiving, storage, and issuing of parts.

1) The title of the individual responsible for the purchasing of all material shall be stated.

2) The title of the individual responsible for certification and other records as required shall be stated.

3) All incoming material and parts shall be checked for conformance with the purchase order and, where applicable, the material specifications or drawings. Indicate how material or part is identified and how identity is maintained by the quality system.

i) Repair and Inspection Program

The repair and inspection program section shall include reference to a document (such as a report, traveler, or checklist) that outlines the specific repair and inspection procedures used in the repair of pressure relief devices ~~valves~~. Repair procedures shall require verification that the critical parts meet the pressure relief device ~~valve~~ manufactur- er's specification. Supplement 4 outlines recommended procedures covering some specific items. This document shall be retained in accordance with Table 4.8.5.4 s).

1) Each pressure relief device~~valve~~ or group of pressure relief devices~~valves~~ shall be accompanied by the document referred to above for pro- cessing through the plant. Each pressure relief device ~~valve~~ shall have a unique identifier (i.e., repair serial number, shop order number, etc.) appearing on the repair documentation and repair nameplate such that trace- ability is established.

2) The document referred to above shall describe the original nameplate information, including the ASME Code symbol stamping and the repair nameplate information, if applicable. In addition, it shall include material checks, replacement parts, conversion parts (or both), reference to items such as the welding procedure specifications (WPS), fitup, NDE technique, heat treatment, and pressure test methods to be used. Application of the "VR" stamp to the repair nameplate shall be recorded in this document. Specific conversions performed with the new Type/Model number shall be recorded on the document. There shall be a space for "signoffs" at each operation to verifythat each step has been properly performed.

3) The system shall include a method of controlling the repair or replacement of critical pressure relief device~~valve~~ parts. The method of identifying each spring shall be indicated on the repair document describedin
4.8.5.4 i). Such identification shall be based on the Manufacturer's spring chart current at the time of the repair, except that the spring removed from the valve during the repair bearing different identification may be reinstalled provided the "VR" Certificate Holder has verified the spring is acceptable to the Manufacturer. Such verification shall be documented on the repair document described in 4.8.5.4 i).

4) The system shall also describe the controls used to ensure that any personnel engaged in the repair of pressure relief device~~valves~~ are trained and qualified in accordance with this section.

j) Welding, NDE, and Heat Treatment (when applicable)

The quality system manual shall indicate the title of the person(s) responsible for and describe the system used in the selection, development, approval, and qualification of welding procedure specifications, and the qualification of welders and welding operators in accordance with the provisions of 4.4.

1) The quality system manual may include controls for the "VR" Certificate Holder to have the pressure relief device~~valve~~ part repaired by a National Board "R" Certificate Holder, per 4.4.7.

2) The completed Form R-1 shall be noted on and attached to the "VR" Certificate Holder's document required in 4.8.5.4 i). Similarly, NDE and heat treatment techniques must be covered in the quality system manual. When outside services are used for NDE and heat treatment, the quality system manual shall describe the system whereby the use of such services meet the requirements of the applicable section of the ASME Code.

k) Pressure Relief device ~~Valve~~ Testing, Setting, and Sealing

The system shall include provisions that each pressure relief device~~valve~~ shall be tested, set, and all external adjustments sealed according to the requirements of the applicable ASME Code Section and the National Board. The seal shall identify the "VR" Certificate Holder making the repair. Abbreviations or initials shall be permit- ted, provided such identification is acceptable to the National Board.

l) Pressure relief device~~Valve~~ Repair Nameplates

An effective pressure relief device~~valve~~ stamping system shall be established to ensure proper stamping of each pressure relief device~~valve~~ as re-
quired by 4.7.2. The manual shall include a description of the nameplate or a drawing.

m) Calibration

1) The manual shall describe a system for the calibration of examination, measuring, and test equipment used in the performance of repairs. Documentation of these calibrations shall include the standard used and the results. Calibration records shall be retained in accordance with Table 4.8.5.4 s).

2) All calibration standards shall be calibrated against certified equipment having known valid relationships to nationally recognized standards.

n) Manual Control

The quality system shall include:

1) Measures to control the issuance of and revisions to the quality system manual;

2) Provisions for a review of the system in order to maintain the manual current with these rules and the applicable sections of the ASME Code;

3) The title(s) of the individual(s) responsible for control, revisions, and review of the manual;

4) Provision of a controlled copy of the written quality system manual to be submitted to the National Board; and

5) Revisions shall be submitted for acceptance by the National Board prior to being implemented.

o) Nonconformities

The system shall establish measures for the identification, documentation, evaluation, segregation, and disposition of nonconformities. A nonconformity is a condition of any material, item, product, or process in which one or more characteristics do not conform to the established requirements. These may include,

TABLE 4.8.5.4 s)

Reports, Records, or Documents for "VR" Certificate Holders	Instructions	Minimum Retention Period
Form "R" reports associated with a pressure relief valve that required welding as part of the repair	Record retention shall be in accordance with Part 3, Table 1.5.1	Refer to Part 3, Table 1.5.1
Record of repair or inspection	The repair and inspection program section shall include reference to a document (such as a report, traveler, or checklist) that outlines the specific repair and inspection procedures used in the repair of pressure relief devices~~valves~~.	5 years
Records related to equipment qualification and instrument calibration	Prior to use, all performancetesting equipment shall be qualified by the certificate holder to ensure that the equipment and testing procedures will provideaccurate results when used within the ranges established for that equipment. This qualification may be accomplished by benchmark testing, comparisons to equipment used for verification testing as specified in the quality system, or comparisons to field performance.	5 years after the subject piece of equipment or instrument is retired.
Record of lift assist device qualification	Prior to use, all lift assist devices shall be qualified by the certificate holder to ensure that the equipment and testing procedures will provide accurate results when used within the ranges established for that equipment used for verification testing as specified in the quality system or comparisons to field performance. This qualification shall be documented.	5 years after the lift assist device is retired.
Records of employee training and qualification	Each repair organization shall establish minimum qualification requirements for those positions within the organization as they directly relate to pressure relief device~~valve~~ repair. Each repair organization shall document the evaluation and acceptance of an individual's qualification for the applicable position.	5 years after termination of employment.

4.8.6 FIELD REPAIR

Repair organizations may obtain a "VR" *Certificate of Authorization* for field repair, either as an extension to their in-shop/plant scope, or as a field-only scope, provided that:

a) Qualified technicians in the employ of the Certificate Holder perform such repairs;

b) An acceptable quality system covering field repairs, including field audits, is maintained; and

c) Functions affecting the quality of the repaired valves are supervised from the address of record where the "VR" certification is issued.

4.8.6.1 AUDIT REQUIREMENTS

Upon issuance of a *Certificate of Authorization*, provided field repairs are performed, annual audits of the work carried out in the field shall be performed to ensure that the requirements of the Certificate Holder's quality system are met. The audit shall include, but not be limited to performance testing in accordance with 4.6 of valve(s) that were repaired in the field. The audits shall be documented.

4.8.6.2 USE OF OWNER OR USER PERSONNEL

For the repair of pressure relief devices~~valves~~ at an owner or user's facility for the owner or user's own use, the "VR" Certificate Holder may utilize owner or user personnel to assist Certificate Holder technician(s) in the perfor- mance of repairs provided:

a) The use of such personnel is addressed in the "VR" Certificate Holder's quality system;

b) The owner or user personnel are trained and qualified in accordance with Supplement 3;

c) Owner or user personnel work under direct supervision and control of the "VR" Certificate Holder's technician(s) during any stage of the repair when they are utilized;

d) The "VR" Certificate Holder shall have the authority to assign and remove owner or user personnel at its own discretion; and

e) The names of the owner or user personnel utilized are recorded on the document as required for a quality system.

4.9 TRAINING AND QUALIFICATION OF PERSONNEL

4.9.1 CONTENTS OF TRAINING PROGRAM

The repair organization shall establish a documented in-house training program. This program shall establish training objectives and provide a method of evaluating training effectiveness. As a minimum, training objectives for knowledge level shall include:

a) Applicable ASME Code and NBIC requirements;

b) Responsibilities within the organization's quality system; and

c) Knowledge of the technical aspects and mechanical skills for the applicable position held.

SUPPLEMENT 3
GUIDE TO JURISDICTIONS FOR AUTHORIZATION OF OWNERS OR USERS TO MAKE ADJUSTMENTS TO PRESSURE RELIEF DEVICES~~VALVES~~

S3.1 GENERAL

The Jurisdiction may authorize properly trained and qualified employees of boiler and pressure vessel owners or users or their designees to confirm or restore set pressure shown on the unmodified original nameplate or stamping, or repair nameplate and/or performance of pressure relief devices~~valves~~. All external adjust- ments shall be resealed with a seal identifying the responsible organization and a metal tag that identifies the organization and the date the adjustment shall be installed.

S3.2 TRAINING

a) The user shall establish a documented in house training program. This program shall establish training objectives and provide a method of evaluating the training effectiveness. As a minimum, training objectives for knowledge level shall include:

1) Applicable ASME Code and NBIC requirements;

2) Responsibilities within the organization's quality system;

3) Knowledge of the technical aspects and mechanical skills for making set pressure and/or blowdown adjustments to pressure relief devices~~valves;~~ and

4) Knowledge of the technical aspects and mechanical skills for marking of pressure relief device ~~valve~~ adjustments.

b) If the user established a designee, the designee shall establish a training program and make their documentation available to the user and the Jurisdictional authority.

S3.3 DOCUMENTATION

Each user shall document the evaluation and acceptance of an employee's or designee's qualifications.

S3.4 QUALITY SYSTEM

a) A written quality system shall be established by either the user or the designee with a written description available to the Jurisdictional authority.

b) The written description shall include at a minimum:

1) Calibration of Test Equipment: This shall describe a system for the calibration of measuring and test equipment. Documentation of these calibrations shall include the standard used and the results. Calibration standards shall be calibrated against the equipment having valid relationships to nationally recognized standards.

2) Pressure relief device~~Valve~~ Testing, Setting, and Sealing: This system shall include provisions that each valve shall be tested, set, and all external adjustments sealed according to the requirements of the applicable ASME Code section and S3.1.

3) Pressure relief device~~Valve~~ Marking: An effective marking system shall be established to ensure proper marking of the metal tag required by S3.1. The written quality system shall include a description or drawing of the metal tag.

S3.5 EXTERNAL ADJUSTMENTS

Only external adjustments to restore the set pressure shown on the unmodified original nameplate or stamping, or repair nameplate and/or performance of a pressure relief device~~valve~~ shall be made under the provi- sions of 2.2.5 and S3.1.

S3.6 REPAIRS

If disassembly, change of set pressure, or additional repairs are necessary, the valve shall be repaired by an organization that meets the requirements of the NBIC.

SUPPLEMENT 4
RECOMMENDED PROCEDURES FOR REPAIRING PRESSURE RELIEF VALVES

S4.1 INTRODUCTION

a) It is essential that the repair organization establish basic, specific procedures for the repair of pressure relief devicesvalves. The purpose of these recommended procedures is to provide the repair organization with guidelines for this important aspect of pressure relief devicevalve repair. It is realized that there are many types of pressure relief devicevalves and conditions under which they are repaired and, for this reason, the specific items in these recommended procedures may not apply, or they may be inadequate for each of those types or to the detailed repairs that may be required for each pressure relief device valve.

b) Prior to removal, repair, or disassembly of a pressure relief devicevalve ensure that all sources of pressure have been removed.

c) S4.2 contains recommended procedures for the repair of spring-loaded pressure relief devicevalves, and S4.3 contains recommended procedures for the repair of pilot operated types of pressure relief devicevalves. Infor- mation on packaging, shipping and transportation is included as S4.5.

S4.2 SPRING-LOADED PRESSURE RELIEF VALVES

a) Visual inspection as received

1) This information is to be recorded:

a. Record user (customer) identification number;

b. Complete original PRV nameplate data, previous repair nameplate data, plus any important information received from customer;

c. Check external adjustment seals for warranty repair;

d. Check bonnet for venting on bellows type valves; and

e. Check appearance for any unusual damage, missing, or misapplied parts.

2) If sufficient damage or other unusual conditions are detected that may pose a safety risk during preliminary testing, then proceed directly to S4.2 c).

3) Valves that are to be repaired in place proceed to S4.2 c) unless preliminary testing has been authorized by the owner.

b) Preliminary test as received

1) Information from the recommended preliminary performance test and subsequent disassembly and inspections will provide a basis for any repair interval change that should be necessary to ensure that the valve will function as intended.

2) Determine set pressure or Cold Differential Test Pressure (CDTP) in accordance with manufacturer's recommendations and appropriate ASME Code Section. Do not allow test pressure to exceed 116% of set pressure unless otherwise specified by the owner. A minimum of three tests is usually required to obtain consistent results.

3) If results do not correlate with field performance, then steps to duplicate field conditions (fluid and temperature) may be necessary.

4) Record preliminary test results and test bench identification data.

g) Nameplate

The repairer will place a repair nameplate on each repaired valve. The nameplate, as a minimum, shall meet the requirements of 4.7.1.

S4.4 Pin Devices:

Prior to removal of a valve from a system for a repair or any disassembly, ensure that all sources of pressure have been removed from the valve.

a) Visual inspection as received
   1. This information is to be recorded:
      a. Record user (customer) identification number.
      b. Complete original PRV nameplate data, previous repair nameplate data, plus any important information received from customer.
      c. Check tamper proof seals for warranty repair.
      d. Check bonnet top, columns and buckling pin screw for any damage or bending. Bent columns will result in a misalignment of the upper and lower pin holders and cause valve to malfunction and shall be removed from service.
      e. Check appearance for any unusual damage, missing, or misapplied parts per manufacturers assembly drawing. In addition, stroke the valve. Make sure the valve will fully lift. This must be full lift, if not go to S4.4 c) Disassembly.
   2. If sufficient damage or other unusual conditions are detected that may pose a safety risk during preliminary testing, then proceed directly to S4.4 c)
   3. Valves that are to be repaired in place proceed to S4.4 c) unless preliminary testing has been authorized by the owner.
b) Preliminary test as received
   1. Information from the recommended preliminary performance test and subsequent disassembly and inspections will provide a basis for any repair interval change that should be necessary to ensure that the valve will function as intended.
   2. The following tests shall be done on Pin Device.
      a. Measure lift force to move plug from closed position to open position. This can be done with pull gage or by using pressure WITHOUT pin.. Repeat 3 times and record the data. Review with manufacturer's original data.
      b. Reseat the plug fully into seat following manufacturer guidelines. Some manufacturers supply a tool for this purpose. This usually can be done by turning the adjuster Buckling Pin Screw on top by hand. If this cannot be done by hand, apply a torque wrench onto the pin adjuster hex and measure the torque required to fully seat. Compare the required torque to seat with manufacturer's original data.
      c. Conduct one(1) pop/opening tests using the manufacturer's pin designated for this specific valve. Do not allow test pressure to exceed 110% of set pressure unless otherwise specified by the owner.
   3. If test results from S4.4b) 2 are outside the manufacturer's recommendation, and pop tests are outside the ASME limits or agreed upon tolerance as stated on tag, proceed to S4.4 c) Disassembly.
   4. Record test results and test bench identification data.

c) Disassembly
   1. Remove Buckling Pin Protective Cage(screen), if applicable

2. Prior to any disassembly, ensure that the plug is re-seated following manufacurer guidelines . Reseating may require torque wrench as specified in S4.4b)2.a Once seated, remove any gag or shipping pin if applicable.

3. Remove the ASME seals on bonnet flange bolts, if applicable.

3.4. 4. Remove the bonnet flange bolts.

5. Remove the bonnet “Flange Assembly - with bonnet flange, columns, upper pin holder top and buckling pin adjuster screw”. Lift the bonnet Flange Assembly straight up vertically using a strap on the upper pin holder top.

6. Remove the bonnet/plug assembly out of seat using thread or nut on top of plug assembly. Be careful not to damage top of plug assembly where buckling pin sets.
    a. As the plug assembly is lifted out of body, handle the assembly carefully and lay it on clean surface. Be careful to not damage plug seat area during this step.

7. Remove the plug from the bonnet. Inspect all seals and replace per manufacturer’s instructions. Check bonnet bore for cleanliness and for wear and scratches. In the event there is minor scratches you may polish this bore. Pay special attention as not to remove material from this bore as this is a critical dimension.

8. Remove plug seat, if applicable, in body and clean and replace seals per manufacturer’s instructions.

d) Cleaning

1. Clean Adjusting screw or holding nut.
2. Thoroughly clean all small parts (Caution: do not use a cleaning method that will damage the parts.)
3. Do not clean in a chemical solution except under acceptable circumstances.
4. Protect seating surfaces and nameplates prior to cleaning.
5. Clean inside of valve body as needed.

e) Inspection

1. Check all parts for corrosion
2. Check nozzle for cracks (NDE as applicable) or unusual wear.
3. .Check plug and stem assembly for cracks (NDE as applicable) or unusual wear.
4. Check bonnet guide for wear
5. Check adjusting screw or holding nut free of galling or damage.
6. Check flange gasket facings for wear and cuts.
7. Check pin bearing points for fit and engagement.

f. Assembly

1. Intall the Seat to the body.
2. Install the plug back into bonnet with new seals and ensure plug is moving freely per manufacturer’s instructions. If moving freely install nut on the piston/plug and set aside for reinstalling the assembly back onto the valve body.
3. Install bonnet plug assembly back into the body carefully

4. Make sure the plug is inserted and fully seated into the plug seat and moving freely after installing the bonnet flange and tightening up the flange studs. This is where centering is very important to get the free movement of plug inside the plug seat per manufacturer's instructions
5. Use pressure for measuring the open pressure without pin. The manufacturer to supply the original manufacturer's load or pressure measurements

g. Testing

1. Test data shall be recorded. Testing will be done in accordance with manufacturer's recommendations and appropriate ASME Code section. To preclude unsafe and unstable valve operations or erroneous performance test results, it is recommended that low volume testing equipment (e.g., gas cylinders with- out a test vessel, hand pumps, tubing) should be avoided.

~~h.~~ h. Sealing

1. After final adjusting and acceptance by quality control inspection, all external adjustments shall be sealed with a safety seal providing a means of identification of the organization performing the repair.

i. Nameplate

1. The repairer will place a repair nameplate on each repaired valve. The nameplate shall, as a minimum, meet the requirements of 4.7.1.

j. Installation of new pin

a. For pin devices with shipping pins, with zero pressure on the inlet or outlet, the shipping pin shall be removed and replaced with pin tagged and traceable to the manufacturer and matches the set pressure, service and valve name plate information.

b. Install pins that are straight and without any deflection, visual defect or damage. c.

Ensure Pin device piston assembly moves freely without excessive resistance or force.

d. Piston assemble will be reseated and pin installed per manufacturer recommendations.

S4.~~5~~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 toinstallation.

b) The following practices are recommended:

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

2) Pressure relief device~~Valve~~ inlet and outlet connection, drain connections, and bonnet vents should be protected during shipment and storage to avoid internal contamination of the valve. Ensure all covers and/or plugs are removed prior to installation.

3) The pressure relief device~~valve~~ should not be picked up or carried using the lifting lever. Lifting levers should be wired or secured so they cannot be moved while the valve is being shipped or stored. These wires shall be removed before the valve is placed in service.

4) Pilot valve tubing should be protected during shipment and storage to avoid damage and/or

breakage.

5) Pressure relief device~~Valves~~ for special services, including but not limited to oxygen, chlorine, and hydrogen perox- ide, should be packaged in accordance with appropriate standards and/or owner procurement requirements.

SUPPLEMENT 5

RECOMMENDED GUIDE FOR THE DESIGN OF A TEST SYSTEM FOR PRESSURE RELIEF DEVICES IN COMPRESSIBLE FLUID SERVICE

S5.1 SCOPE

This supplement provides guidance for the design of a test system using compressible fluids (e.g., steam or air/gas) and permits the determination of pressure relief devices ~~valve~~ set pressure and pressure relief valve ~~valve~~ operating characteris- tics such as blowdown.

The size of the test vessel needed depends on the size of the pressure relief device~~valve~~, its set pressure, the design of the test system, and whether blowdown must be demonstrated. A repair organization may use the information
provided in this supplement to determine the minimum size test vessel needed so that the measured performance is characteristic of the pressure relief device~~valve~~ and not the test system.

S5.2 GENERAL

a) The National Board administrative rules and procedures for the "VR" *Certificate of Authorization* and symbol stamp require that pressure relief device~~valves~~, after repair, be tested in accordance with the manu- facturer's recommendations and the applicable ASME Code. The purpose of this testing is to provide reasonable assurance that pressure relief device~~valves~~ will perform according to design when they are returned to service.

b) It is recognized that a full evaluation of the performance of some pressure relief device~~valve~~ designs requires testing at maximum allowable overpressure. However, it is beyond the scope of this supplement to define test equipment or facilities for such testing.

c) Section 6 of this part provides a glossary, S5.3 describes typical test equipment, and S5.4 provides data for estimating the size of test vessels required.

S5.3 TEST SYSTEM DESCRIPTION

a) An optimum configuration, particularly when the test medium source is of small capacity, is shown in Figure S5.3-a. The test medium flows from the pressure source, usually a compressor or boiler, to an accumulator. It then flows through a pressure-controlling valve into the test vessel, from which it is discharged, through the pressure relief device valve installed on the test vessel. The pressure-controlling valve is usually a globe valve, although ~~gh any~~ throttling valve is acceptable. If the pressure-controlling valve is of adequate size and can open quickly, large transient flows can be generated, increasing the pressure above the pressure relief device valve set pressure, causing it to lift, and be sustained in its liftedcondition.

b) Figure S5.3-b shows a simpler test system in which the test vessel is pressurized directly from the pressure source without the use of an accumulator. In this configuration, flow-rates through the pressure relief device valve and any consequent over-pressure are dependent on the flow generating capacity of the pr~~essure~~ source.

c) In a test facility, the pressure relief device valve is usually installed on an isolating valve that should be of suf- ficient size that it will not cho~~ke flo~~w to the pressure relief device valve. There should be no intervening piping between the two isolating and pressure relief d~~evice~~ valves to avoid any significant inlet pressure drop between the test vessel and the pressure relief valve.

d) The isolating valve and any adapter flanges or pressure relief device valve test nozzles must be designed to sustain pressure relief valve discharge forces, and so secured that these forces are not transmitted to the test vessel. This is especially important for larger pressure relief device valves set at pressures greater than 100 psig (700 kPa).

e) The vessel should have a length-to-diameter ratio as low as is practical, and should be suitably

f) Pressure sensing lines should be connected to the test vessel well away from any inlet or outlet connections where pressure distortions due to transient changes in flow velocity during testing could cause erroneous pressure readings. When testing with steam, any water head that develops in the gage line must be taken into consideration.

g) Any intervening piping between the test vessel and the pressure relief valve should be as short and as straight as possible and be of adequate size to minimize inlet pressure drop.

h) In the case of steam, the equipment should be insulated and steam traps should be installed, as appropriate, to ensure that the test steam is dry, saturated steam with a minimum quality of 98%.

i) Pressure relief valves shall be used to protect the test vessel and the accumulator.

FIGURE S5.3-a
SCHEMATIC OF TEST EQUIPMENT WITH ACCUMULATOR

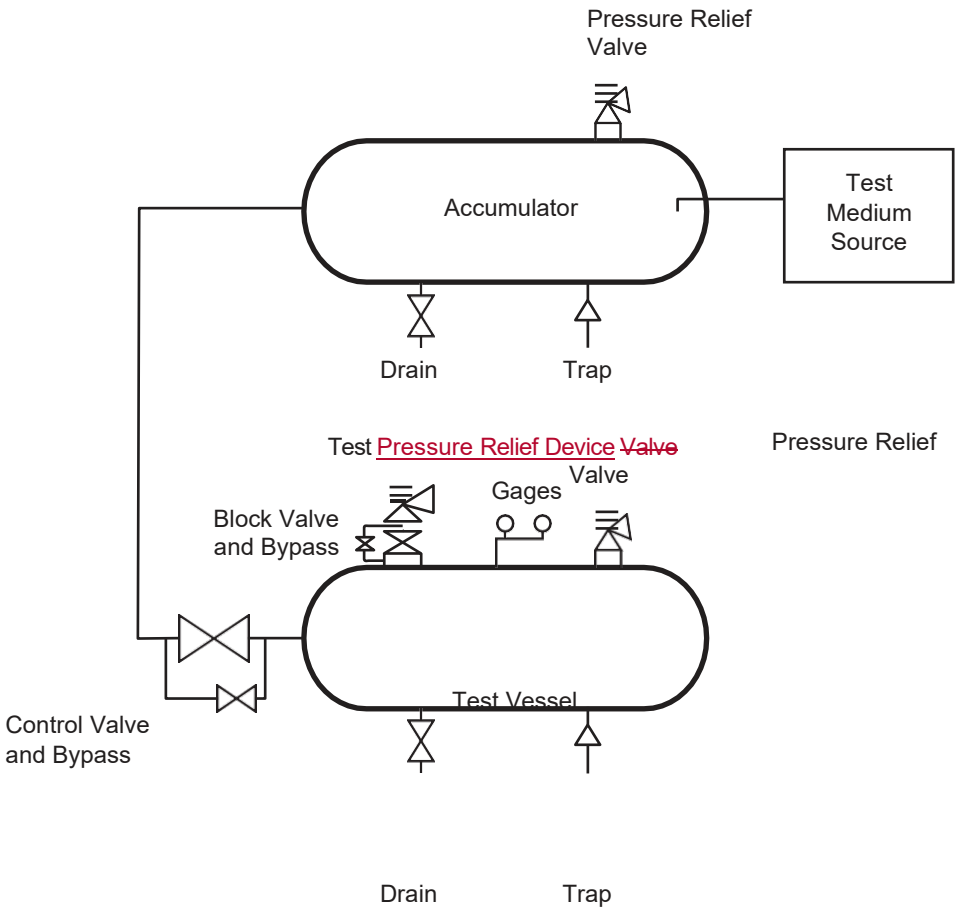
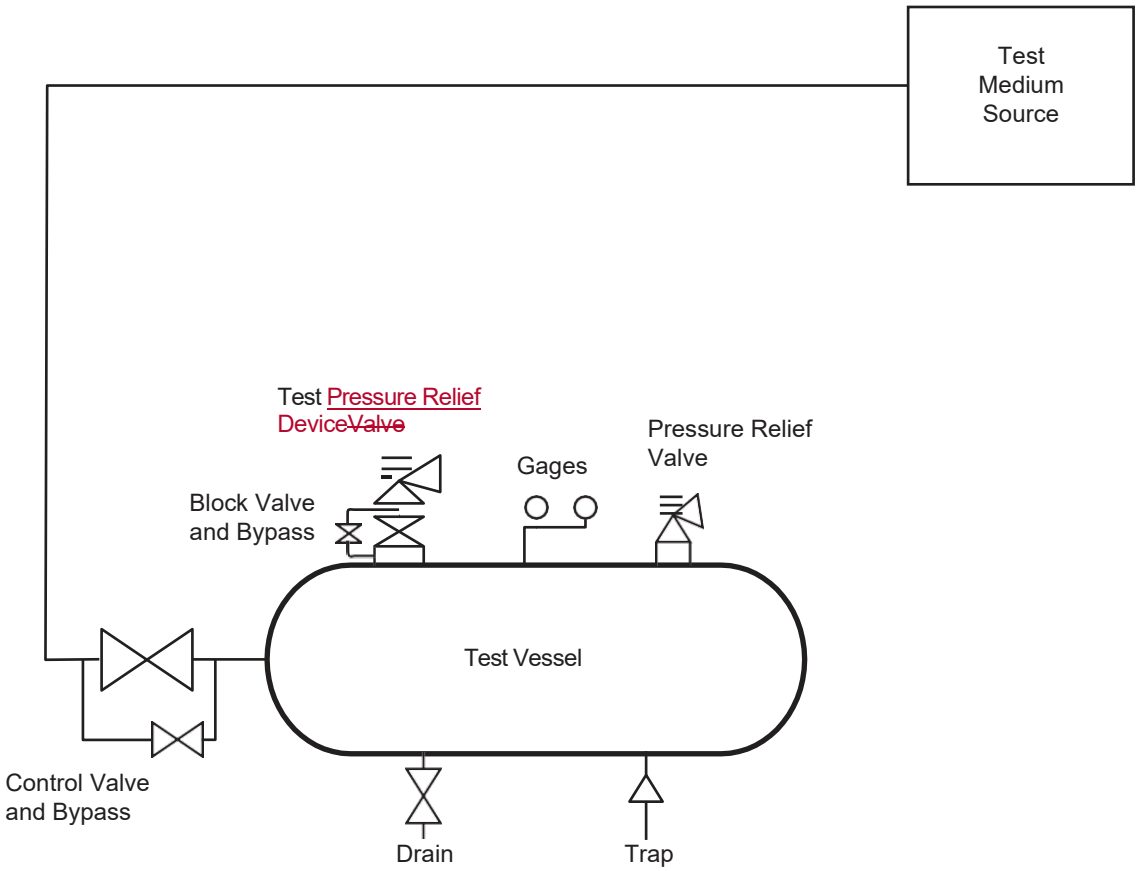


FIGURE S5.3-b
SCHEMATIC OF TEST EQUIPMENT WITHOUT ACCUMULATOR



S5.4 TEST VESSEL SIZING DATA

a) Recommended test vessel sizes are given in Figures S5.4-a and S5.4-b for a configuration using one vessel fed directly from the source of the test medium. Figure S5.3-a gives the test vessel size in ft^3 (m^3) vs. the valve orifice area in $in.^2$ (cm^2) for dry, saturated steam. Curves are shown for set pressures up to 500 psig (3.45MPa) for three different blowdowns: 4%, 7%, and 10%. The source is assumed to be capable of feeding the test vessel at 2500 lbs/hr. (1135 kg/hr). Figure S5.4-b gives similar curves for air with a source capable of feeding the test vessel at 200 ft^3/min (5.66m^3/min).

b) For pressure relief devices ~~valves~~, with effective orifices less than 1.28 $in.^2$ (826 mm^2), the size of the test vessel needed becomes less dependent on the flow capacity of the source. For these valves, a 15 $ft.^3$ (.425 m^3) min- imum size test vessel is recommended. This should allow the accurate measurement and setting of blowdown for small pressure relief valves. This minimum size should also be adequate for determining set pressures of larger pressure relief devices ~~valves~~; however, larger test vessels must be used if pressure relief valve blowdown is to be set accurately. It is recognized that there are practical limits on the size and maximum pressure of a test vessel used to demonstrate pressure relief device ~~valve~~ operational characteristics. In such cases, determination of pressure relief device~~valve~~ set pressure remains the only viable production and repair test option. The recommended minimum size test vessel (15 $ft.^3$ [0.425 m^3]) is normally adequate for this purpose.

National Board Commissioned Inspector — An individual who holds a valid and current National Board Commission.

NBIC — The *National Board Inspection Code* published by The National Board of Boiler and Pressure Vessel Inspectors.

Nuclear Items — Items constructed in accordance with recognized standards to be used in nuclear power plants or fuel processing facilities.

Original Code of Construction — Documents promulgated by recognized national standards writing bodies that contain technical requirements for construction of pressure-retaining items or equivalent to which the pressure-retaining item was certified by the original manufacturer.

Overfire Air — Air admitted to the furnace above the grate surface /fuel bed. Used to complete the combustion of fine particles, in suspension. Also aids in reducing NOx formation.

Owner or User — As referenced in lower case letters means any person, firm, or corporation legally responsible for the safe operation of any pressure-retaining item.

Owner-User Inspection Organization — An owner or user of pressure-retaining items that maintains an established inspection program, whose organization and inspection procedures meet the requirements of the National Board rules and are acceptable to the Jurisdiction or Jurisdictional Authority wherein the owner or user is located.

Owner-User Inspector — An individual who holds a valid and current National Board Owner-User Commission.

Piecing — A repair method used to remove and replace a portion of piping or tubing material with a suitable material and installation procedure.

Pilot Operated Pressure Relief Valve — A pressure relief valve in which the disk is held closed by system pressure, and the holding pressure is controlled by a pilot valve actuated by system pressure.

Pin Device: A pin device is a nonreclosing pressure relief device actuated by inlet static or differential pressure and designed to function by the activation of a load bearing section of a pin that supports a pressure-containing member. A pin is the load bearing activation component of a pin device its crosssectional area is not limited to a circular shape. A pin device body is the structure that encloses the pressure-containing members.

Plate Heat Exchanger (PHE) — An assembly of components consisting of heat transfer plates and their supporting frame. The frame provides structural support and pressure containment and may consist of fixed endplates, moveable endplates, an upper carrying bar and lower guide bar which provide plate alignment, and frame compression bolts.

Pneumatic Test — A pressure test which uses air or another compressible gas as the test medium.

Potable Water Heaters — A corrosion resistant appliance that includes the controls and safety devices to supply potable hot water at pressure not exceeding 160 psig (1,100 kPa) and temperature not in excess of 210°F (99°C).

> **Fired Storage Water Heater** — A potable water heater in which water is heated by electricity, the combustion of solid, liquid, or gaseous fuels and stores water within the same appliance.
>
> **Indirect Fired Water Heater** — A potable water heater in which water is heated by an internal coil or heat exchanger that receives its heat from an external source. Indirect fired water heaters provide water directly to the system or store water within the same appliance.
>
> **Circulating Water Heater** — A potable water heater which furnishes water directly to the system or to a separate storage tank. Circulating water heaters may be either natural or forced flow.

Potable Water Storage Tank — an unfired pressure vessel used to store potable hot water at temperatures not exceeding 210°F (99°C).

Pressure Relief Device — A device designed to prevent pressure or vacuum from exceeding apredetermined value in pressure vessel by the transfer of fluid during emergency or abnormal conditions.

Pressure Relief Valve (PRV) — A pressure relief device designed to actuate on inlet static pressure and reclose after normal conditions have been restored.

Pressure-Retaining Items (PRI) — Any boiler, pressure vessel, piping, or material used for the containment of pressure, either internal or external. The pressure may be obtained from an external source, or by the application of heat from a direct source, or any combination thereof.

Pressure roll load — The terms line load, and nip load are used interchangeably to refer to the interaction between the pressure roll(s) and the Yankee dryer. It is called “nip” load because the pressure roll is rubber-covered and is pressed up against the Yankee with enough force to create a nip (or pinch) that forces the paper into line contact between the rolls and provides some mechanical dewatering. The paper then sticks onto the Yankee surface and follows the Yankee dryer for thermal dewatering by the steam-heated Yankee surface. This “nip load” is called a “line load” because the units are load (force) per length of line contact. The units are pounds per linear inch (PLI) and kilonewtons per meter (kN/m).

Pressure Test — A test that is conducted using a fluid (liquid or gas) contained inside a pressure-retaining item.

Pressure Vessel — A pressure vessel is a container other than a boiler or piping used for the containment of pressure.

“R” Certificate Holder — An organization in possession of a valid “R” *Certificate of Authorization* issued by the National Board.

Re-ending — A method used to join original code of construction piping or tubing with replacement piping or tubing material for the purpose of restoring a required dimension, configuration or pressure-retaining capacity.

Relief Valve — A pressure relief valve characterized by gradual opening that is generally proportional to the increase in pressure. It is normally used for incompressible fluids.

Repair — The work necessary to restore pressure-retaining items to a safe and satisfactory operating condition.

Re-rating (re-rate) — See alteration. Re-rate does not apply to pressure relief devices.

Regulatory Authority — A government agency, such as the United States Nuclear Regulatory Commission, empowered to issue and enforce regulations concerning the design, construction, and operation of nuclear power plants.

Safe Point of Discharge — A location that will not cause property damage, equipment damage, or create a health or safety threat to personnel in the event of discharge.

Safety Relief Valve — A pressure relief valve characterized by rapid opening or by gradual opening that is generally proportional to the increase in pressure. It can be used for compressible or incompressible fluids.

Safety Valve — A pressure relief valve characterized by rapid opening and normally used to relieve compressible fluids.

Seal Weld — Any weld designed primarily to provide a specific degree of tightness against leakage. A seal weld is not intended to provide structural integrity to a pressure retaining item.

Settings — Those components and accessories required to provide support for the component during operation and during any related maintenance activity.

Shop — A permanent location, the address that is shown on the *Certificate of Authorization*, from which a Certificate Holder controls the repair and/or alteration of pressure-retaining items.

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NBIC PART 1

3.9 PRESSURE RELIEF VALVES

See NBIC Part 1, 3.2 for the scope of pressure retaining items covered by these requirements.

3.9.1 PRESSURE RELIEF VALVE REQUIREMENTS – GENERAL

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

3.9.1.1 INSTALLATION OF PRESSURE RELIEF VALVES FOR STEAM HEATING, HOTWATER HEATING, AND HOT-WATER SUPPLY BOILERS

3.9.1.1.1 PERMISSIBLE INSTALLATION

Pressure relief valves shall be located at the top side of the boiler. The top side of the boiler shall mean the highest practicable part of the boiler proper but in no case shall the safety valves be located below the normal operating level and in no case shall the pressure relief valve be located below the lowest permissible water level. They shall be connected directly to a tapped or flanged opening in the boiler, to a fitting connected to the boiler by a short nipple, to a Y-base, or to a valveless header connecting steam or water outlets on the same boiler. Coil or header type boilers shall have the pressure relief valve located on the steam or hot-water outlet end. Pressure relief valves shall be installed with their spindles vertical. The opening or connection between the boiler and any pressure relief valve shall have at least the area of the valve inlet.

a) For a Low Mass Watertube boiler of 10 gallons or less, the pressure relief valve may be installed below the boiler provided:

1) A UL-353 certified flow sensing device is installed to automatically cut off the fuel supply if circulation through the boiler is interrupted;

2) The pressure relief valve is installed with the spindle in the vertical position;

3) The opening or connection between the boiler and the pressure relief valve shall have an area at least equal to the nominal inside area of a Schedule 80 pipe (as defined by ASME B36.10) and of the same nominal pipe size as the inlet of the valve.

3.9.4 PRESSURE RELIEF VALVE REQUIREMENTS FOR POTABLE WATER HEATERS

a) Each water heater shall have at least one National Board capacity certified temperature and pressure relief valve. No temperature and pressure relief valve shall be smaller than NPS 3/4 (DN 20).

b) The pressure setting shall be less than or equal to the maximum allowable working pressure of the water heater. However, if any of the other components in the hot-water supply system (such as valves, pumps, expansion or storage tanks, or piping) have a lesser working pressure rating than the water heater, the pressure setting for the temperature and pressure relief valve(s) shall be based upon the component with the lowest maximum allowable working pressure rating. If more than one temperature

and pressure relief valve is used, the additional valve(s) may be set within a range not to exceed 10% over the set pressure of the first valve.

c) The required relieving capacity in Btu/hr (W) of the temperature and pressure relief valve shall not be less than the maximum allowable input unless the water heater is marked with the rated burner input capacity of the water heater on the casing in a readily visible location, in which case the rated burner input capacity may be used as a basis for sizing the temperature pressure relief valves. The relieving capacity for electric water heaters shall be 3,500 Btu/hr (1.0 kW) per kW of input. In every case, the following requirements shall be met. Temperature and pressure relief valve capacity for each water heater shall be such that with the fuel burning equipment installed and operated at maximum capacity, the pressure cannot rise more than 10% above the maximum allowable working pressure.
Many temperature and pressure relief valves have a National Board capacity certified rating which was determined according to ASME Code requirements, and a lower Canadian Standards Association (CSA) rating value. Where the ASME Code is the only referenced code of construction the National Board capacity certified rating may be used. If the water heater is not an ASME vessel, or the CSA rating is required by another standard (such as a plumbing or building code) then that rating shall be used.

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

3.9.4.1 INSTALLATION

Temperature and pressure relief valves shall be installed by either the water heater manufacturer or installer before a water heater is placed in operation.

3.9.4.2 PERMISSIBLE INSTALLATIONS

Temperature and pressure relief valves shall be connected directly to a tapped or flanged opening in the top of the water heater or to a fitting connected to the water heater by a short nipple. Temperature and pressure relief valves shall be installed with their spindles upright and vertical with no horizontal connecting pipe, except that, when the temperature and pressure relief valve is installed directly on the water heater vessel with no more than 4 in. (100 mm) maximum interconnecting piping, the valve may be installed in the horizontal position with the outlet pointed down. The center line of the temperature and pressure relief valve connection shall be no lower than 4 in. (100 mm) from the top of the shell. No piping or fitting used to install the temperature and pressure relief valve shall be of nominal pipe size less than that of the valve inlet.

a) For a Low Mass Watertube boiler of 10 gallons or less, the pressure relief valve may be installed below the boiler provided:

1) A UL-353 certified flow sensing device is installed to automatically cut off the fuel supply if circulation through the boiler is interrupted;

2) The pressure relief valve is installed with the spindle in the vertical position;

3) The opening or connection between the boiler and the pressure relief valve shall have an area at least equal to the nominal inside area of a Schedule 80 pipe (as defined by ASME B36.10) and of the same nominal pipe size as the inlet of the valve.

NBIC PART 4

2.4 PRESSURE RELIEF VALVES FOR STEAM HEATING, HOT WATER HEATING, AND HOT WATER SUPPLY BOILERS

See NBIC Part 1, 3.2 for the scope of pressure retaining items covered by Part 4, 2.4.

2.4.1 GENERAL REQUIREMENTS

The following general requirements pertain to the installation of pressure relief valves on heating boilers.

2.4.1.1 INSTALLATION OF PRESSURE RELIEF VALVES FOR HEATING BOILERS

2.4.1.1.1 PERMISSIBLE INSTALLATION

Pressure relief valves shall be located at the top side of the boiler. The top side of the boiler shall mean the highest practicable part of the boiler proper but in no case shall the safety valves be located below the normal operating level and in no case shall the pressure relief valve be located below the lowest permissible water level. They shall be connected directly to a tapped or flanged opening in the boiler, to a fitting connected to the boiler by a short nipple, to a Y-base, or to a valveless header connecting steam or water outlets on the same boiler. Coil or header type boilers shall have the pressure relief valve located on the steam or hot-water outlet end. Pressure relief valves shall be installed with their spindles vertical. The opening or connection between the boiler and any pressure relief valve shall have at least the area of the valve inlet.

a) For a Low Mass Watertube boiler of 10 gallons or less, the pressure relief valve may be installed below the boiler provided:

1) A UL-353 certified flow sensing device is installed to automatically cut off the fuel supply if circulation through the boiler is interrupted;

2) The pressure relief valve is installed with the spindle in the vertical position;

3) The opening or connection between the boiler and the pressure relief valve shall have an area at least equal to the nominal inside area of a Schedule 80 pipe (as defined by ASME B36.10) and of the same nominal pipe size as the inlet of the valve.

2.4.4 PRESSURE RELIEF VALVE REQUIREMENTS FOR POTABLE WATER HEATERS

a) Each water heater shall have at least one National Board capacity certified temperature and pressure relief valve. No temperature and pressure relief valve shall be smaller than NPS 3/4 (DN 20).

b) The pressure setting shall be less than or equal to the maximum allowable working pressure of the water heater. However, if any of the other components in the hot-water supply system (such as valves, pumps, expansion or storage tanks, or piping) have a lesser working pressure rating than the water heater, the pressure setting for the temperature and pressure relief valve(s) shall be based upon the component with the lowest maximum allowable working pressure rating. If more than one temperature and pressure relief valve is used, the additional valve(s) may be set within a range not to exceed 10% over the set pressure of the first valve.

c) The required relieving capacity in Btu/hr (W) of the temperature and pressure relief valve shall not be less than the maximum allowable input unless the water heater is marked with the rated burner input capacity of the water heater on the casing in a readily visible location, in which case the rated burner input capacity may be used as a basis for sizing the temperature pressure relief valves. The relieving capacity for electric water heaters shall be 3,500 Btu/hr (1.0 kW) per kW of input. In every case, the following requirements shall be met. Temperature and pressure relief valve capacity for each water heater shall be such that with the fuel burning equipment installed and operated at maximum capacity, the pressure cannot rise more than 10% above the maximum allowable working pressure.
Many temperature and pressure relief valves have a National Board capacity certified rating which was determined according to ASME Code requirements, and a lower Canadian Standards Association (CSA) rating value. Where the ASME Code is the only referenced code of construction the National Board capacity certified rating may be used. If the water heater is not an ASME vessel, or the CSA rating is required by another standard (such as a plumbing or building code) then that rating shall be used.

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

2.4.4.1 INSTALLATION

Temperature and pressure relief valves shall be installed by either the water heater manufacturer or installer before a water heater is placed in operation.

2.4.4.2 PERMISSIBLE INSTALLATIONS

Temperature and pressure relief valves shall be connected directly to a tapped or flanged opening in the top of the water heater or to a fitting connected to the water heater by a short nipple. Temperature and pressure relief valves shall be installed with their spindles upright and vertical with no horizontal connecting pipe, except that, when the temperature and pressure relief valve is installed directly on the water heater vessel with no more than 4 in. (100 mm) maximum interconnecting piping, the valve may be installed in the horizontal position with the outlet pointed down. The center line of the temperature and pressure relief valve connection shall be no lower than 4 in. (100 mm) from the top of the shell. No piping or fitting used to install the temperature and pressure relief valve shall be of nominal pipe size less than that of the valve inlet.

a) For a Low Mass Watertube boiler of 10 gallons or less, the pressure relief valve may be installed below the boiler provided:

1) A UL-353 certified flow sensing device is installed to automatically cut off the fuel supply if circulation through the boiler is interrupted;

2) The pressure relief valve is installed with the spindle in the vertical position;

3) The opening or connection between the boiler and the pressure relief valve shall have an area at least equal to the nominal inside area of a Schedule 80 pipe (as defined by ASME B36.10) and of the same nominal pipe size as the inlet of the valve.

NBIC ITEM NO: 19-83
SCOPE: ADDRESS ALTERNATE PRV MOUNTING PERMITTED BY ASME CC 2887-1.

Approval Date: December 12, 2017

Code Cases will remain available for use until annulled by the applicable Standards Committee.

Case 2887-1
Alternate Safety Relief Valve Mounting for Low Mass Watertube Boilers and Water Heaters
Section IV

Inquiry: Under what conditions may safety relief valves be mounted below a low mass watertube boiler or water heater?

Reply: It is the opinion of the Committee that safety relief valves may be mounted below a low mass watertube boiler or water heater, provided the following requirements are met:

(a) Water volume shall be 10 gal (38 L) or less.

(b) A UL-353 certified flow sensing device shall be installed to automatically cut off the fuel supply if circulation through the boiler is interrupted.

(c) The safety relief valve inlet piping is connected to a vertical section of the hot water outlet piping (see Figure 1).

(d) Safety relief valves shall be installed with their spindles vertical.

(e) The opening or connection between the boiler and any safety relief valve shall have an area at least equal to the nominal inside area of a Schedule 80 pipe (as defined by ASME B36.10) and of the same nominal pipe size as the inlet of the valve.

(f) All other requirements of Section IV shall be met.

(g) This Case number shall be recorded on the Manufacturer's Data Report.

TASK GROUP:
D. MAREK (ch)
T. PATEL, J. BALL

Item 21-05. Develop Implementation Audit

Initial Language:

4.8.5.4 r) Field Repairs

If field repairs are included in the scope of work, the system shall address any differences or additions to the quality system required to properly control this activity, including the following:

1) Provisions for annual audits of field activities shall be included;

2) Provisions for receipt and inspection of replacement parts, including parts received from the owner-user, shall be addressed;

3) If owner-user personnel will assist with repairs, provisions for the use of owner user personnel shall be included; and

4) Provisions for use of owner-user measurement and test equipment, if applicable, shall be addressed.

4.8.6 FIELD REPAIR

Repair organizations may obtain a “VR” *Certificate of Authorization* for field repair, either as an extension to their in-shop/plant scope, or as a field-only scope, provided that:

1) Qualified technicians in the employ of the Certificate Holder perform such repairs;

2) An acceptable quality system covering field repairs, including field audits, is maintained; and

3) Functions affecting the quality of the repaired valves are supervised from the address of record where the “VR” certification is issued.

4.8.6.1 AUDIT REQUIREMENTS

Upon issuance of a *Certificate of Authorization*, provided field repairs are performed, annual audits of the work carried out in the field shall be performed to ensure that the requirements of the Certificate Holder’s quality system are met. The audit shall include, but not be limited to performance testing in accordance with 4.6 of valve(s) that were repaired in the field. The audits shall be documented.

Proposed Language:

4.8.5.4 r) Field Repairs

If field repairs are included in the scope of work, the system shall address any differences or additions to the quality system required to properly control this activity, including the following:

~~1) Provisions for annual audits of field activities shall be included;~~

~~2)~~1) Provisions for receipt and inspection of replacement parts, including parts received from the owner-user, shall be addressed;

~~3)~~2) If owner-user personnel will assist with repairs, provisions for the use of owner user personnel shall be included; and

~~4)~~3) Provisions for use of owner-user measurement and test equipment, if applicable, shall be addressed.

Table 4.8.5.4 (s) Addition:

Records of audits of the Quality Program	The repair organization shall audit the Quality System on an annual basis Audit results shall be documented, and any exclusions shall be noted. ~~The exclusions as well as audit results shall be documented.~~	5 Years

4.8.6 FIELD REPAIR

Repair organizations may obtain a "VR" *Certificate of Authorization* for field repair, either as an extension to their in-shop/plant scope, or as a field-only scope, provided that:

1) Qualified technicians in the employ of the Certificate Holder perform such repairs;

2) An acceptable quality system covering field repairs~~, including field audits,~~ is maintained; and

3) Functions affecting the quality of the repaired valves are supervised from the address of record where the "VR" certification is issued.

~~**4.8.6.1 AUDIT REQUIREMENTS**~~

~~Upon issuance of a *Certificate of Authorization*, provided field repairs are performed, annual audits of the work carried out in the field shall be performed to ensure that the requirements of the Certificate Holder's quality system are met. The audit shall include, but not be limited to~~

~~performance testing in accordance with 4.6 of valve(s) that were repaired in the field. The audits shall be documented~~

4.11 Annual Audits.

Upon Issuance of a Certificate of Authorization, the repair organization shall audit the Quality System of the repair program on an annual basis. The quality manual shall define the auditing criteria, scope, frequency, and methods to ensure the requirements of the NBIC and Certificate Holder's Quality System are effectively implemented. The scope shall include but not be limited to:

a) Drawing and Specification Control 4.8.5.4 (g)

b) Material and Part Control 4.3 & 4.8.5.4 (h)

c) Repair and Inspection Program 4.8.5.4 (i)

d) Welding, NDE and Heat Treatment 4.8.5.4 (j) (when ~~applicable~~[DA1] in scope)

e) Valve Testing, Setting, and Sealing 4.8.5.4 (k)

f) Valve Repair Name Plates 4.8.5.4 (l)

g) Calibration 4.8.5.4 (m)

h) Manual and Documentation Control 4.8.5.4 (n)

i) Nonconformities 4.8.5.4 (o)

j) Testing Equipment 4.8.5.4 (q)

k) Field Repair 4.8.5.4 (r) (when in scope)[DA2]

l) Record Retention 4.8.5.4 (s)

m) Competency, Training & Qualification of Personnel 4.9

n) Use of Personnel not in the Certificate Holder's employ 4.10[DA3]

The audit results shall be documented. Mandatory items ~~outside~~ in the repair organization's scope ~~or items~~ [DA4]that have not been performed during the annual audit period shall be documented as exceptions in the audit results.

PROPOSED REVISION OR ADDITION

Item No.

21-18

Subject/Title

Pressure Tests for Pressure Relief Valve Repair Parts

NBIC Location

Part: Pressure Relief Devices; Section: 4.6.4; Paragraph: a) 1)

Project Manager and Task Group

Source (Name/Email)

Denis DeMichael / Denis.B.DeMichael@chemours.com

Statement of Need

Pressure relief valve manufacturers must produce valve parts that comply with ASME Code requirements to be able to apply the ASME Symbol Stamp and Designator to a new valve. These parts are the same that are sold as repair parts. The logistic issues to fabricate and maintain an inventory of spare parts not complying with ASME Code requirements is significant versus producing all parts in compliance with code. Consequently, why have a pressure test requirement for parts purchased from the valve manufacturer for those certificate holders who chose to buy parts produced by the manufacturer?

Background Information

See Statement of Need.

Existing Text

The “VR” Certificate Holder is responsible for documentation that the appropriate pressure test has been completed as required by the original code of construction.

Proposed Text

Unless the part is fabricated by the valve manufacturer, the “VR” Certificate Holder is responsible for documentation that the appropriate pressure test has been completed as required by the original code of construction.

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

CODE REVISIONS OR ADDITIONS

Request for code revisions or additions shall provide the following:

a) Proposed Revisions or Additions
For revisions, identify the rules of the code that require revision and submit a copy of the appropriate rules as they appear in the code, marked up with the proposed revision. For additions, provide the recommended wording referenced to the existing code rules.

b) Statement of Need
Provide a brief explanation of the need for the revision or addition.

c) Background Information
ide background information to support the revision or addition, including any data or changes in nology that form the basis for the request that will allow the Committee to adequately evaluate the osed revision or addition. Sketches, tables, figures, and graphs should be submitted as appropriate. n applicable, identify any pertinent paragraph in the code that would be affected by the revision or tion and identify paragraphs in the code that reference the paragraphs that are to be revised or added.

PROPOSED REVISION OR ADDITION

Item No.

A 21-36

Subject/Title

Add Test Details to NBIC Part 4, 3.3.3.4 i) Valve Adjustment and Sealing

NBIC Location

Part: Pressure Relief Devices & Pressure Relief Devices; Section: 3. & 3.; Paragraph: 3.3.3.4 i) & 3.3.3.4 i) 1)

Project Manager and Task Group

Source (Name/Email)

J. Alton Cox / alton@jaltoncox.com

Statement of Need

There is no reference in the T/O requirements for Set Pressure Testing, use of proper Test Fluid or Seat Tightness unless and until a minor adjustment is required. This is surely the intent, but it is not clearly specified as it is in the current VR requirements.

Background Information

With regard to Test Only (T/O), NBIC Part 4 currently references portions of NBIC Part 4, Para. 3.2.5 for minor adjustment and use of a Lift Assist Device. NBIC Part 4, Para. 3.2.5 in portions not referred to by 3.3.3.4 recommends Set Pressure & Seat Tightness, but does not require either. Should rather than Shall is the current wording.

Existing Text

Proposed Text

3.3.3.4 i) Valve Testing, Adjustment, and Sealing 3.3.3.4.i) 1) The system shall include provisions that each pressure relief valve shall be tested in accordance with 4.6.1 a). Each pressure relief valves requiring adjustment as permitted by 3.2.5.2 shall have existing seal(s) removed only for the required adjustment(s), be tested, set, and external adjustment(s) re-sealed according to the requirements of the applicable ASME Code Section and the NBIC.

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

ITEM 21-49 Proposal 10/5/21

NBIC Part 4 Paragraph 3.3.3.4

d) Statement of Authority and Responsibility

A statement of authority and responsibility shall be dated and signed by an officer of the company. It shall include:

1) A statement that the “T/O” Certification Mark shall be used only for pressure relief valves that meet the following conditions:

a) Are marked with an ASME “V”, “UV”, or “HV” Code symbol or marked with the ASME Certification Mark with “V”, “UV”, or “HV” designator and have been capacity certified by the National Board;

b) Have been visually inspected, and successfully tested in accordance with this program; and

c) Only external adjustments to restore the nameplate set pressure and/or performance of a pressure relief valve shall be made under the provisions of this program. If disassembly, change of set pressure, or additional repairs are necessary, the valve shall be repaired by a National Board “VR” Certificate Holder or replaced.

2) The title of the individual responsible for ensuring that the quality system is followed and who has authority and freedom to affect the responsibility;

3) A statement that if there is a disagreement in the implementation of the written quality system, the matter is to be referred to a higher authority in the company for resolution; and

4) The title of the individual authorized to approve revisions to the written quality system and the method by which such revisions are to be submitted to and accepted by the National Board ~~for acceptance~~ before implementation.

l) Manual Control/Procedures

The quality system manual and referenced procedures shall include:

1) Measures to control the issuance of and revisions to the quality system manual;

2) Provisions for a review of the system in order to maintain the manual current with these rules and the applicable sections of the ASME Code;

3) The title(s) of the individual(s) responsible for preparation, revision distribution, approval, and implementation of the quality system manual;

4) Provision for a controlled copy of the accepted written quality system manual to be submitted to the National Board ~~for acceptance prior to implementation~~; and

5) Revisions shall be submitted for to and accepted by ~~acceptance by~~ the National Board prior to being implemented.

NBIC Part 4 Paragraph 4.8.5.4

d) Statement of Authority and Responsibility

A statement of authority and responsibility shall be dated and signed by an officer of the company. It shall include:

1) A statement that the “VR” stamp shall be applied only to pressure relief valves that meet both of the following conditions:

a. Are marked with the ASME Certification Mark and the “V”, “UV”, “HV”, or “NV” Designator or the supplanted ASME “V”, “UV”, “HV” or “NV” Code symbol and have been capacity certified by the National Board; and

b. Have been disassembled, inspected, and repaired by the Certificate Holder such that the valves’ condition and performance are equivalent to the standards for new valves.

2) The title of the individual responsible to ensure that the quality system is followed and who has authority and freedom to effect the responsibility;

3) A statement that if there is a disagreement in the implementation of the written quality system, the matter is to be referred to a higher authority in the company for resolution; and

4) The title of the individual authorized to approve revisions to the written quality system and the method by which such revisions are to be submitted to and accepted by the National Board ~~for acceptance~~ before implementation.

n) Manual Control
The quality system shall include:

1) Measures to control the issuance of and revisions to the quality system manual;

2) Provisions for a review of the system in order to maintain the manual current with these rules and the applicable sections of the ASME Code;

3) The title(s) of the individual(s) responsible for control, revisions, and review of the manual;

4) Provision of a controlled copy of the accepted written quality system manual to be submitted to the National Board; and

5) Revisions shall be submitted to and accepted by the National Board prior to being implemented.

ITEM 21-51 Proposal 10-5-21

SUPPLEMENT 3
PRESSURE RELIEF AND PILOT VALVE STORAGE & SHELF LIFE

S3.1 SCOPE
This supplement provides guidance for proper conditions and duration of pressure relief valve storage. This guidance applies to pressure relief valves, temperature & pressure relief valves, and pilot operated pressure relief valves (including the main body valve and the pilot valve).

S3.2 PRESSURE RELIEF VALVE STORAGE
Pressure relief valve set pressure and/or seat tightness can deviate during storage. The manufacturer's recommendations should be followed regarding shelf life. In some cases, it may be necessary to retest the pressure relief valve prior to installation or reduce maintenance interval if the pressure relief valve was in storage for an extended period. When storing pressure relief valves, a first in / first out policy should be followed.

S3.3 PRESSURE RELIEF VALVE STORAGE CONDITIONS
Pressure ~~R~~relief valves should be stored per manufacturer recommendations. Storage temperature should be within the operating or storage temperature range provided by the manufacturer. Where the manufacturer has no recommendations, the following guidelines should be followed.

a) Storage temperature should be between 40 and 72 °F, where practical.
b) Ideal relative humidity in the storage area should be 70 percent or less. For pressure relief valves with soft seats, relative humidity should be kept between 30 and 70 percent. Some soft materials require a minimum humidity level to prevent material degradation.
c) Storage area should have a non-corrosive atmosphere. Otherwise, stored pressure relief valves should be protected from the atmosphere.
d) Pressure ~~R~~relief valves that utilize spindles or weights should be stored in a vertical position.
e) Temperature and pressure relief valves should have their probes supported to prevent bending or detachment.
f) All ports should be plugged, blanked, or capped.
g) Pressure ~~R~~relief valves that have been cleaned for oxidizing gas or other specialty service should be sealed in a plastic bag. Plastic wrapping may be acceptable for larger pressure relief valves.
h) Storage should be off the ground (e.g. on a shelf or pallet).
i) Storage area should limit exposure to direct sunlight
j) Pressure ~~R~~relief valves constructed of materials subject to corrosion (such as carbon steel) should be painted or otherwise protected against the environment prior to storage.

S3.4 PRESSURE RELIEF VALVE SHELF LIFE
Pressure Relief valve shelf life shall be determined based upon manufacturer's recommendations and performance history. Shelf life may increase or decrease based upon storage conditions and performance history. In the absence of manufacturer or service provider recommendations, and performance history, the shelf life recommendations per table S3.4 should be used when stored in accordance with S3.3. Shelf life may be increased or decreased, from the recommended values, once performance history is established.

TABLE S3.4

RECOMMENDED PRESSURE RELIEF VALVE SHELF LIFE (IF NOT PROVIDED BY MANUFACTURER)

Pressure Relief Valve Description/Recommended Shelf Life (years)

Temperature and pressure relief valve/2

Pressure relief valve with metal-to-metal seat/5

Pressure relief valve with nonmetal seat/2

S3.4.1 EXCEEDING SHELF LIFE

If shelf life is exceeded, the pressure relief valve shall either be tested prior to installation or tested using its lift lever (if applicable) following installation. Storage for a length of time less than the shelf life of the pressure relief valve does not reduce the time before the first regularly scheduled retest. If performance history shows that time in storage less than shelf life causes the device to function outside of acceptable tolerance, then the shelf life shall be reduced.

ITEM 21-52

Part 4 Paragraph 2.5.3

2.5.3 LOCATION

a) The pressure relief device shall be installed directly on the pressure vessel, unless the source of pressure is external to the vessel and is under such positive control that the pressure cannot exceed the maximum overpressure permitted by the original code of construction and the pressure relief device cannot be isolated from the vessel, except as permitted by 2.5.6 e).~~ 2)~~

Part 1 Paragraph 4.5.3

4.5.3 LOCATION

a) The pressure relief device shall be installed directly on the pressure vessel, unless the source of pressure is external to the vessel and is under such positive control that the pressure cannot exceed the maximum overpressure permitted by the original code of construction and the pressure relief device cannot be isolated from the vessel, except as permitted by 4.5.6 e).~~ 2)~~

PROPOSED REVISION OR ADDITION

Item No.

A 21-63

Subject/Title

Require unique identifier marked on Pilots in addition to main valves

NBIC Location

Part: Pressure Relief Devices; Section: 4; Paragraph: 4.7.2

Project Manager and Task Group

Source (Name/Email)

Thomas Beirne / tbeirne@nationalboard.org

Statement of Need

The 2021 Edition of ASME BPVC Section XIII requires pilots of pilot operated pressure relief valves be marked with a unique identifier that matches the main valve (Section I has similar approved text for the 2023 Edition). This should be addressed for VR nameplates as well since pilots can be replaced as VR operation.

Background Information

See statement of need.

Existing Text	Proposed Text
	Add a subparagraph c) to paragraph 4.7.2 to address a separate nameplate marking requirements for the pilot of pilot operated pressure relief valve.

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

ITEM 21-72 Proposal 11/10/21

4.7.2 REPAIR NAMEPLATES

When a pressure relief valve is repaired, a metal repair nameplate stamped with the information required below shall be securely attached to the valve adjacent to the original manufacturer's stamping or nameplate. If not installed directly on the valve, the nameplate shall be securely attached to the valve independent of the external adjustment seals in a manner that does not interfere with valve operation and sealed in accordance with the quality system.

a) Prior to attachment of the repair nameplate, the previous repair nameplate, if applicable, shall be removed from the repaired valve.

b) As a minimum, the information on the valve repair nameplate (see Figure 4.7.2-a) shall include:

1) The name of the repair organization preceded by the words "repaired by";
2) The "VR" repair symbol stamp and the "VR" certificate number;
3) Unique identifier (e.g., repair serial number, shop order number, etc.);
4) Date of repair;
5) Set pressure;
6) Capacity and capacity units (if changed from original nameplate ~~due to set pressure or service fluid change~~);
7) Type/Model number (if changed from original nameplate ~~by a conversion. See 4.2~~); and
8) When an adjustment is made to correct for service conditions of superimposed back pressure and/ or temperature, the information on the valve repair nameplate shall include the:
    a. Cold Differential Test Pressure (CDTP); and
    b. Superimposed Back Pressure (BP) (only when applicable).

ITEM 21-73 Proposal 11/10/21

4.7.3 CHANGES TO ORIGINAL PRESSURE RELIEF VALVE NAMEPLATE INFORMATION

a) If changes are required to be made to the information on the original nameplate or stamping, that information shall be marked out, but left legible. Any changes to capacity shall be based on that for which the valve was originally certified, or if a conversion has been made, as described in 4.2, on the capacity certification for the valve as converted. ~~If the set pressure is changed, the set pressure, capacity, and blowdown, if applicable, on the original nameplate or stamping shall be marked out but left legible. The new capacity shall be based on that for which the valve was originally certified.~~

~~b) If the service fluid is changed, the capacity, including units, on the original nameplate or stamping shall be marked out but left legible. The new capacity shall be based on that for which the valve was originally certified, or if a conversion has been made, as described in 4.2 on the capacity certification for the valve as converted.~~

~~c) If the Type/Model number is changed, the Type/Model number on the original nameplate or stamping shall be marked out but left legible.~~

~~d) If the blowdown is changed, the blowdown, if shown on the original nameplate or stamping, shall be marked out but left legible. The new blowdown may be based on the current ASME Code requirements.~~

~~e~~b) Repair organizations shall verify the Type/Model number, inlet size, set pressure, and capacity on the original nameplate or stamping that is not marked out. Incorrect information on the original manufacturer's nameplate or stamping shall be marked out but left legible. Corrected information shall be indicated on the repair nameplate and noted on the document as required by the quality system.

ITEM 21-76 Proposal 12/13/21

PART 4,

3.2.4.3 PRESSURE VESSELS AND PIPING

Standard practice for overpressure protection devices is to not permit any type of isolation valve either before or after the device. However, some pressure vessel standards permit isolation valves under certain controlled conditions when shutting down the vessel to repair a damaged or leaking valve. If isolation block valves are employed, their use should be carefully controlled by written procedures. Block valves should have provisions to be either car-sealed or locked in an open position when not being used. For ASME Section VIII, Div. 1 pressure vessels, see UG-~~135~~156, Appendix M, and Jurisdictional rules for more information.

PART 2,

2.5.5.3 PRESSURE VESSELS AND PIPING

Standard practice for overpressure protection devices is to not permit any type of isolation valve either before or after the device. However, some pressure vessel standards permit isolation valves under certain controlled conditions when shutting down the vessel to repair a damaged or leaking valve. If isolation block valves are employed, their use should be carefully controlled by written procedures. Block valves should have provisions to be either car-sealed or locked in an open position when not being used. For ASME Section VIII, Div. 1 pressure vessels, see UG-~~135~~156, Appendix M, and Jurisdictional rules for more information.

Wadkinson	Melissa	Manufacturers	Chair	07/30/2024	Details
Wiggins	Edward	Jurisdictional Authorities	Vice Chair	07/30/2023	Details
Bock	Jeanne		Secretary	01/30/2099	Details
Vance	Michelle		Secretary	12/30/2099	Details
Austin	Randall	Users	Member	10/30/2022	Details
Brockman	Joe	Authorized Inspection Agencies	Member	07/30/2023	Details
Creacy	Todd	Authorized Inspection Agencies	Member	01/30/2024	Details
Downs	James	Manufacturers	Member	10/30/2022	Details
Jennings	Patrick	Authorized Inspection Agencies	Member	07/30/2024	Details
Konopacki	Stanley	Users	Member	01/30/2023	Details
Patten	Don	Manufacturers	Member	01/30/2023	Details
Richards	H. Michael	General Interest	Member	07/30/2024	Details
Smith	Rex	Authorized Inspection Agencies	Member	01/30/2023	Details
Spiker	Ronald	Jurisdictional Authorities	Member	07/30/2024	Details
Washington	Milton	Jurisdictional Authorities	Member	01/30/2023	Details

NB11-1901

SUPPLEMENT X
INSTALLATION OF HIGH PRESSURE COMPOSITE PRESSURE VESSELS

SX.1 SCOPE

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

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

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

c) FRP vessel with a non-load sharing metallic liner

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

SX.2 SUPPORTS

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

highest value specified for any category in ASCE/SEI 7.

SX.3 CLEARANCES

The pressure vessel installation shall allow sufficient clearance for normal operation, maintenance, and inspection. Stacking of pressure vessels is permitted. The minimum clear space between pressure vessels shall be 1 ft. vertical and 2 ft. horizontal. Vessel nameplates shall be visible after installation for inspection. The location of vessels containing flammable compressed natural gas fluids shall comply with NFPA 52. The location of vessels containing hydrogen or other flammable fluids shall comply with NFPA 2. The vessel owner shall document the vessel pressure and pipe diameters used as a basis for compliance with NFPA 2 location requirements.

SX.4 PIPING LOADS

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

SX.5 MECHANICAL CONNECTIONS

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

SX.6 PRESSURE INDICATING DEVICES

Each pressure vessel shall be equipped with a pressure gage mounted on the vessel. The dial range shall be from 0 psi to not less than 1.25 times the vessel MAWP. The pressure gage shall have an opening not to exceed 0.0550in (1.4mm) (No. 54 drill size) at the inlet connection. In addition, vessel pressure shall be monitored by a suitable remote pressure indicating device with alarm having an indicating range of 0 psi to not less than 1.25 times the vessel MAWP.

SX.7 PRESSURE RELIEF DEVICES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SX.8 ASSESSMENT OF INSTALLATION

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

b) Vessels shall not be buried.

c) Vessels may be installed in a vault subject to a hazard analysis, verified by the manufacturer, owner, user, qualified engineer, or the Jurisdiction, to include as a minimum the following:

1) Ventilation

2) Inlet and outlet openings

3) Access to vessels

4) Clearances

5) Intrusion of ground water

6) Designed for cover loads

7) Explosion control

8) Ignition sources

9) Noncombustible construction

10) Remote monitoring for leaks, smoke, and fire

11) Remote controlled isolation valves

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

e) Installation locations shall provide the following:

1) Guard posts shall be provided to protect the vessels from vehicular damage per NFPA 2 or NFPA 52, as appropriate. Protection from wind, seismic events shall be provided.

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

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

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

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

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

7) Completed installations shall be validated as required by the Jurisdiction as addressing all of the above, and any requirements of the Jurisdiction, prior to first use. This verification shall be posted in a conspicuous location near the vessel and, when required, on file with the

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

8) Piping installation shall comply with ASME B31.12, NFPA 52, or NFPA 2.

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

SX.9 LADDERS AND RUNWAYS

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

Supplement 10

Installation of Carbon Monoxide Detectors in Boiler Rooms

S10.1 Scope

This supplement provides guidelines for the installation of carbon monoxide (CO) detectors/alarms in fuel fired equipment rooms.

Carbon Monoxide (CO) is a ~~poisonous~~toxic, colorless, odorless and tasteless gas that can cause injury and even death if not detected. ~~Statistics show about 400 deaths and 10,000 hospitalizations each year from non-fire related CO incidents.~~ High levels of CO can be an indication of poor combustion leading to inefficient operation resulting in increased fuel usage and emissions or improperly installed or corroded flue piping.

All boiler mechanical rooms containing one or more boilers and/or pressure vessels from which carbon monoxide can be produced should be equipped with a carbon monoxide detector that can meet the criteria below.

S10.2 General Requirements for Installation of Carbon Monoxide Detector

It is recommended a carbon monoxide detector and any PRI that can produce CO should be interlocked to stop the production of CO by disabling all equipment capable of producing CO in the space the equipment is installed.

(a) (C) The CO Detector should be interlocked to disable all PRI's capable of producing CO in the space the PRI is installed when the detector trips.

(A)CO Detectors without remote monitoring in the space where CO is capable of being produced.

(1) The CO Detector should be of the manual reset type

(2) The CO Detector should set to alarm and trip at 50 PPM. [JE1]

(B) CO Detectors provided with remote monitoring in the space where CO is capable of being produced.

(1) The CO Detector should be of the manual reset type.

(2) The CO Detector should be set to alarm at 50 PPM

(3) The CO Detector should set to trip at 200 PPM. [JE2]

(c) When the CO Detector trips in (a) or (b) above, the detector should be interlocked with all PRI's installed in the space to secure the PRI's, thus stopping the production of CO.

(d) The carbon monoxide detector should be calibrated in accordance with the manufacturer's recommendations or every eighteen months after installation of the detector. A record of calibration should be identified on the CO Detector.

Initial installation and calibration should be performed in accordance with the manufacturers requirements. Subsequent inspections should be performed in accordance with recognized industry or regulatory standards.

KEY EXCERPTS FROM NFPA 720

• 5.8.5.3.3 Carbon Monoxide detectors shall be marked in accordance with their listing. Detector thresholds shall be set to respond at the levels specified by ANSI/UL2034, Standard for Single and Multiple Station Monoxide Alarms.

• 5.8.5.3.4 All carbon monoxide detectors shall be located and mounted so that accidental operation will not be caused by jarring or vibration.

• 5.8.5.3.5 The location of carbon monoxide detectors shall be based on an evaluation of potential ambient sources and flows of carbon monoxide, moisture, temperature, dust, or fumes and of electrical influences to minimize nuisance alarms [72: 17.7.1.9]

• 5.8.5.3.6 The selection and placement of [carbon monoxide] detectors shall take into account both the performance characteristics of the detector and the areas into which the detectors are to be installed to prevent nuisance and unintentional alarms or improper operation after installation [72: 17.7.1.7

Single and Multiple Station Carbon Monoxide Alarms

UL 2034

1 Scope

1.1 These requirements cover electrically operated single and multiple station carbon monoxide (CO) alarms intended for protection in ordinary indoor locations of dwelling units, including recreational vehicles, mobile homes, and recreational boats with enclosed accommodation spaces and cockpit areas.

SECTION915
CARBON MONOXIDE DETECTION

[F]915.1General.
CDP
Carbon monoxide detection shall be installed in new buildings in accordance with Sections 915.1.1 through 915.6. Carbon monoxide detection shall be installed in existing buildings in accordance with Chapter 11 of the *International Fire Code*.

[F]915.1.1Where required.
Carbon monoxide detection shall be provided in Group I-1, I-2, I-4 and R occupancies and in classrooms in Group E occupancies in the locations specified in Section 915.2 where any of the conditions in Sections 915.1.2 through 915.1.6 exist.

[F]915.1.2Fuel-burning appliances and fuel-burning fireplaces.
Carbon monoxide detection shall be provided in *dwelling units*, *sleeping units* and classrooms that contain a fuel-burning appliance or a fuel-burning fireplace.

[F]915.1.3Fuel burning, forced-air furnaces.
Carbon monoxide detection shall be provided in dwelling units, sleeping units and classrooms served by a fuel-burning, forced-air furnace.

Exception: Carbon monoxide detection shall not be required in *dwelling units*, *sleeping units* and classrooms if a carbon monoxide detector is provided in the first room or area served by each main duct leaving the furnace, and the carbon monoxide alarm signals are automatically transmitted to an approved location.

[F]915.1.4Fuel-burning appliances outside of dwelling units, sleeping units and classrooms.
Carbon monoxide detection shall be provided in *dwelling units*, *sleeping units* and classrooms located in buildings that contain fuel-burning appliances or fuel-burning fireplaces.

Exceptions:

1. Carbon monoxide detection shall not be required in *dwelling units*, *sleeping units* and classrooms without communicating openings between the fuel-burning appliance or fuel-burning fireplace and the *dwelling unit*, *sleeping unit* or classroom.
2. Carbon monoxide detection shall not be required in *dwelling units*, *sleeping units* and classrooms where a carbon monoxide detector is provided in one of the following locations:
   2.1. In an *approved* location between the fuel-burning appliance or fuel-burning fireplace and the *dwelling unit*, *sleeping unit* or classroom.
   2.2. On the ceiling of the room containing the fuel-burning appliance or fuel-burning fireplace.

[F]915.1.5Private garages.
Carbon monoxide detection shall be provided in *dwelling units*, *sleeping units* and classrooms in buildings with attached *private garages*.

Exceptions:

1.Carbon monoxide detection shall not be required in dwelling units, sleeping units and classrooms without communicating openings between the *private garage* and the *dwelling unit, sleeping unit* or classroom.
2.Carbon monoxide detection shall not be required in *dwelling units, sleeping units* and classrooms located more than one *story* above or below a *private garage*.
3.Carbon monoxide detection shall not be required where the *private garage* connects to the building through an *open-ended corridor*.
4.Where a carbon monoxide detector is provided in an *approved* location between openings to a *private garage* and *dwelling units, sleeping units* or classrooms.

[F]915.1.6Exempt garages.
For determining compliance with Section 915.1.5, an *open parking garage* complying with Section 406.5 or an enclosed parking garage complying with Section 406.6 shall not be considered a *private garage*.

[F]915.2Locations.
Where required by Section 915.1.1, carbon monoxide detection shall be installed in the locations specified in Sections 915.2.1 through 915.2.3.

[F]915.2.1Dwelling units.
Carbon monoxide detection shall be installed in *dwelling units* outside of each separate sleeping area in the immediate vicinity of the bedrooms. Where a fuel-burning appliance is located within a bedroom or its attached bathroom, carbon monoxide detection shall be installed within the bedroom.

[F]915.2.2Sleeping units.
CDP
Carbon monoxide detection shall be installed in *sleeping units*.
Exception: Carbon monoxide detection shall be allowed to be installed outside of each separate sleeping area in the immediate vicinity of the *sleeping unit* where the *sleeping unit* or its attached bathroom does not contain a fuel-burning appliance and is not served by a forced air furnace.

[F]915.2.3Group E occupancies.
Carbon monoxide detectors shall be installed in classrooms in Group E occupancies. Carbon monoxide alarm signals shall be automatically transmitted to an on-site location that is staffed by school personnel.

Exception: Carbon monoxide alarm signals shall not be required to be automatically transmitted to an on-site location that is staffed by school personnel in Group E occupancies with an *occupant load* of 30 or less.

[F]915.3Carbon monoxide detection.
Carbon monoxide detection required by Sections 915.1 through 915.2.3 shall be provided by carbon monoxide alarms complying with Section 915.4 or carbon monoxide detection systems complying with Section 915.5.

[F]915.4Carbon monoxide alarms.

Carbon monoxide alarms shall comply with Sections 915.4.1 through 915.4.4.

[F]915.4.1Power source.
Carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than that required for overcurrent protection.

Exception: Where installed in buildings without commercial power, battery-powered carbon monoxide alarms shall be an acceptable alternative.

[F]915.4.2Listings.
Carbon monoxide alarms shall be listed in accordance with UL 2034.

[F]915.4.3Locations.
Carbon monoxide alarms shall only be installed in *dwelling units* and in *sleeping units*. They shall not be installed in locations where the code requires carbon monoxide detectors to be used.

[F]915.4.4Combination alarms.
Combination carbon monoxide/smoke alarms shall be an acceptable alternative to carbon monoxide alarms. Combination carbon monoxide/smoke alarms shall be listed in accordance with UL 217 and UL 2034.

[F]915.5Carbon monoxide detection systems.
CDP
Carbon monoxide detection systems shall be an acceptable alternative to carbon monoxide alarms and shall comply with Sections 915.5.1 through 915.5.3.

[F]915.5.1General.
CDP
Carbon monoxide detection systems shall comply with NFPA 720. Carbon monoxide detectors shall be *listed* in accordance with UL 2075.

[F]915.5.2Locations.
CDP
Carbon monoxide detectors shall be installed in the locations specified in Section 915.2. These locations supersede the locations specified in NFPA 720.

[F]915.5.3Combination detectors.
CDP
Combination carbon monoxide/smoke detectors installed in carbon monoxide detection systems shall be an acceptable alternative to carbon monoxide detectors, provided that they are listed in accordance with UL 268 and UL 2075.

[F]915.6Maintenance.
Carbon monoxide alarms and carbon monoxide detection systems shall be maintained in accordance with the *International Fire Code*.

OSHA FactSheet

Carbon Monoxide Poisoning

Carbon monoxide (CO) is a poisonous, colorless, odorless and tasteless gas. Although it has no detectable odor, CO is often mixed with other gases that do have an odor. So, you can inhale carbon monoxide right along with gases that you can smell and not even know that CO is present.

CO is a common industrial hazard resulting from the incomplete burning of material containing carbon such as natural gas, gasoline, kerosene, oil, propane, coal, or wood. Forges, blast furnaces and coke ovens produce CO, but one of the most common sources of exposure in the workplace is the internal combustion engine.

How does CO harm you?

Carbon monoxide is harmful when breathed because it displaces oxygen in the blood and deprives the heart, brain and other vital organs of oxygen. Large amounts of CO can overcome you in minutes without warning — causing you to lose consciousness and suffocate.

Besides tightness across the chest, initial symptoms of CO poisoning may include headache, fatigue, dizziness, drowsiness, or nausea. Sudden chest pain may occur in people with angina. During prolonged or high exposures, symptoms may worsen and include vomiting, confusion and collapse in addition to loss of consciousness and muscle weakness. Symptoms can vary widely from person to person. CO poisoning may occur sooner in those most susceptible: young children, the elderly, people with lung or heart disease, people at high altitudes, or those who already have elevated CO blood levels, such as smokers. Also, CO poisoning poses a special risk to fetuses.

CO poisoning can be reversed if caught in time. But even if you recover, acute poisoning may result in permanent damage to the parts of your body that require a lot of oxygen such as the heart and brain. Significant reproductive risk is also linked to CO.

Who is at risk?

You may be exposed to harmful levels of CO in boiler rooms, warehouses, petroleum refineries, pulp and paper production, and steel production; around docks, blast furnaces, or coke ovens; or in one of the following occupations:

- Welder
- Garage mechanic
- Firefighter
- Carbon-black maker
- Organic chemical synthesizer
- Metal oxide reducer
- Longshore worker
- Diesel engine operator
- Forklift operator
- Marine terminal worker
- Toll booth or tunnel attendant
- Customs inspector
- Police officer
- Taxi driver

What can you do if you suspect that someone has been poisoned with CO?

When you suspect CO poisoning, promptly taking the following actions can save lives:

- Move the victim immediately to fresh air in an open area.
- Call 911 or another local emergency number for medical attention or assistance.
- Administer 100 percent oxygen using a tight-fitting mask if the victim is breathing.

- Administer cardiopulmonary resuscitation if the victim has stopped breathing.

Warning: You may be exposed to fatal levels of CO poisoning in a rescue attempt. Rescuers should be skilled at performing recovery operations and using recovery equipment. Employers should make sure that rescuers are not exposed to dangerous CO levels when performing rescue operations.

How can employers help prevent CO poisoning?

To reduce the chances of CO poisoning in the workplace, employers should take the following actions:

- Install an effective ventilation system that will remove CO from work areas.
- Maintain equipment and appliances (e.g., water heaters, space heaters, cooking ranges) that can produce CO in good working order to promote their safe operation and to reduce CO formation.
- Consider switching from gasoline-powered equipment to equipment powered by electricity, batteries, or compressed air if it can be used safely.
- Prohibit the use of gasoline-powered engines or tools in poorly ventilated areas.
- Provide personal CO monitors with audible alarms if potential exposure to CO exists.
- Test air regularly in areas where CO may be present, including confined spaces. See Title 29 of the Code of Federal Regulations (CFR) 1910.146.
- Use a full-facepiece pressure-demand self-contained breathing apparatus (SCBA) certified by the National Institute for Occupational Safety and Health (NIOSH), or a combination full-facepiece pressure demand supplied-air respirator with auxiliary self-contained air supply in areas with high CO concentrations, i.e., those with immediately dangerous to life and health atmospheres. (See 29 CFR 1910.134.)
- Use respirators with appropriate canisters, in conjunction with personal CO monitoring, for short periods under certain circumstances where CO levels are not exceedingly high.
- Educate workers about the sources and conditions that may result in CO poisoning as well as the symptoms and control of CO exposure.

In addition, if your employees are working in confined spaces where the presence of CO is suspected, you must ensure that workers test for oxygen sufficiency before entering.

What can employees do to help prevent CO poisoning?

Employees should do the following to reduce the chances of CO poisoning in the workplace:

- Report any situation to your employer that might cause CO to accumulate.
- Be alert to ventilation problems — especially in enclosed areas where gases of burning fuels may be released.
- Report promptly complaints of dizziness, drowsiness, or nausea.
- Avoid overexertion if you suspect CO poisoning and leave the contaminated area.
- Tell your doctor that you may have been exposed to CO if you get sick.
- Avoid the use of gas-powered engines, such as those in powered washers as well as heaters and forklifts, while working in enclosed spaces.

What are the OSHA standards for CO exposure?

- The OSHA PEL for CO is 50 parts per million (ppm). OSHA standards prohibit worker exposure to more than 50 parts of CO gas per million parts of air averaged during an 8-hour time period.
- The 8-hour PEL for CO in maritime operations is also 50 ppm. Maritime workers, however, must be removed from exposure if the CO concentration in the atmosphere exceeds 100 ppm. The peak CO level for employees engaged in Ro-Ro operations (roll-on roll-off operations during cargo loading and unloading) is 200 ppm.

Workers' Rights

Workers have the right to:

- Working conditions that do not pose a risk of serious harm.
- Receive information and training (in a language and vocabulary the worker understands) about workplace hazards, methods to prevent them, and the OSHA standards that apply to their workplace.
- Review records of work-related injuries and illnesses.

- File a complaint asking OSHA to inspect their workplace if they believe there is a serious hazard or that their employer is not following OSHA's rules. OSHA will keep all identities confidential.
- Exercise their rights under the law without retaliation, including reporting an injury or raising health and safety concerns with their employer or OSHA. If a worker has been retaliated against for using their rights, they must file a complaint with OSHA as soon as possible, but no later than 30 days.

For additional information, see OSHA's Workers page (www.osha.gov/workers).

How to Contact OSHA

Under the Occupational Safety and Health Act of 1970, employers are responsible for providing safe and healthful workplaces for their employees. OSHA's role is to help ensure these conditions for America's working men and women by setting and enforcing standards, and providing training, education and assistance. For more information, visit www.osha.gov or call OSHA at 1-800-321-OSHA (6742), TTY 1-877-889-5627.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

U.S. Department of Labor

OSHA® Occupational Safety and Health Administration

DSG FS-3522 04/2012

ITEM 20-34, 20-35 (and 20-40) COMBINED

PROPOSED CHANGES – The following proposal is based on the comments recorded during the R&C ballot. Comments show where the changes were incorporated or felt they were already addressed. All comments are presented in the background information.

1.6.5 FUEL

All fuel systems shall be installed in accordance with jurisdictional and environmental requirements, manufacturer's recommendations[JP-H1], and/or industry standards, such as ASME CSD-1, ANSI Z/CSA, NFPA 85 or others, as applicable[JP-H2]

a) Natural Gas
   1) Cleaning
      a. It is recommended that strainers be installed in the main gas line leading to the boiler control equipment.
      b. A sediment trap is required prior to the gas controls. This trap shall be located in a vertical section of pipe as close as practical upstream of the gas controls.
   2) Manual Valves
      a. A manual valve is required upstream of all controls and as close as practical to the boiler to isolate the fuel train when required. If a pilot line is upstream of the manual valve on the main fuel train, it shall also have a manual valve.
      b. These manual valves shall be accessible from the floor and designed to be opened/closed without additional tools. They shall be ball or a lubricated plug type with a non-removable handle that is perpendicular to the gas flow when closed and parallel when open and the valves shall have stops.
      c. If the non-removable handle creates a hazard, the handle can be temporarily removed provided the valve handle is always on while the valve is in the open position. At all times, the position of the valve shall be indicated. When the valve is in the closed position and the handle is not attached, the valve shall be tagged/locked out and the handle shall be tethered and accessible.
      d. If the valve is not part of a listed and labeled assembly, the valve shall comply with a nationally recognized standard.
   3) Vents

      For gas components that are vented or bled, the following requirements apply:[JP-H3]

      a. All vent or bleed lines from natural gas equipment such as regulators, controls, switches, relief, vent valves, etc. shall be vented outside to a safe point of discharge per the manufacturer's requirements [JP-H4]or the authority having jurisdiction.
      b. Vent and bleed line shall be sized in accordance with a nationally recognized standard.
      c. Manifold of vent lines or of bleed lines shall be in accordance with a nationally recognized standard. Vent lines shall not be manifolded with bleed lines.

d. No vent or bleed line shall discharge into a flue.

e. Vent materials shall be selected such that they shall have suitable strength and durability for their intended purpose and shall be listed for the intended purpose by the jurisdiction having authority or a nationally recognized standard.

b) Fuel Oil -

A strainer or filter shall be installed upstream of the safetyshutoff valves.[JP-H5]

BACKGROUND INFORMATION

Comments to R&C ballot 4-22 to 05/21 2021

1) Don Patten

Committee Member:	Don Patten	**Vote Date:**	2021-04-29	**Vote:**	Approved	**Uploads:**	
Member Comment:	See below information. Something needs to be inserted in 3) Vents allowing for ventless gas components & trains. Exception: A regulator and vent limiting means combination listed as complying with ANSI Z21.80/CSA 6.22, Line Pressure Regulators, shall be permitted to be used without a vent to the outdoors. Also some gas valves and switches are certified as ventless (Siemens, Dungs, etc.).						
PM Reply:	Thank you for the comment. You are correct, there are many components that don't require vents. We already reference national standards in the opening, so perhaps an introductory statement such as the following would suffice: For gas components that are vented, the following requirements apply:						

2) Melissa Wadkinson

Committee Member:	Melissa Wadkinson	**Vote Date:**	2021-05-19	**Vote:**	Approved	**Uploads:**	
Member Comment:	I'll approve this but upon reading do we want to add some language "or in accordance with the manufacturer's instructions"?						
PM Reply:	Thank you for the comment and support. In the lead paragraph of 1.6.5, the existing words include manufacturer's recommendations. "All fuel systems shall be installed in accordance with jurisdictional and environmental requirements, manufacturer's recommendations, and/or industry standards, such as....." Everything added regarding Natural Gas is a subset to the lead in, so I believe that it is already covered. This raises a good question however. There is no guidance on how to resolve a conflict between the NBIC and the manufacturer's recommendation however.						

3) Eddie Wiggins

1.6.5 FUEL

All fuel systems shall be installed in accordance with jurisdictional and environmental requirements, manufacturer's recommendations, and/or industry standards, such as ASME CSD-1, applicable ANSI Z/CSA, NFPA 85 or others as applicable.

WE **Wiggins, Ed**
Pat, should t
word of the s

4) H. Michael Richards

Committee Member:	H. Michael Richards	**Vote Date:**	2021-05-12	**Vote:**	Approved	**Uploads:**	
Member Comment:	As edited 5/12/2021						
PM Reply:	Mr. Richards. I am sorry, but I don't understand your comment.						

REVIEW – The following is the original review that led to the above.

NBIC part 1 addresses fuel for all boilers in 1.6.5. Controls are part of 2.5.3.3 and 3.5.3.3. The intent here is to address fuel train related items. It does not make sense to break up the equipment between fuel supply equipment (sediment trap, shutoff valves) and the controls equipment (vents). They are fuel related equipment, so the new requirements should be located in 1.6.5.

FOLLOWING is the Review of CSD-1 and what was suggested in the January 20 meeting.

CF - 120

CSD – 1 Summary	NBIC – Yes/No and words.	Should it cover
CF-120 – Fuel Train		
a) Non-mandatory appendix provides typical fuel train examples. Fuel trains other than those pictured, but meeting the standard shall be permitted.	Following are the current wording in NBIC. 1.4.5.1.1 Guide for Completing National Board Boiler Installation Report 40) External Piping ASME CODE AND FUEL TRAIN: Indicate if external piping is ASME Code, if not, indicate what code or standard external piping is manufactured to. Indicate if the fuel train meets the requirements of CSD-1 or… 1.6.5 Fuel – All fuel systems shall be installed in accordance with jurisdictional and environmental requirements, manufacturer's recommendations, and/or industry standards, such as ASME CSD-1, applicable ANSI Z/CSA, NFPA 85 or others as applicable.	YES

	Fuel train component requirements will be based on the standard, fuel fired and the heat input. 2.5.2 Fuel See NBIC Part 1, Section 1.6.5, *Fuel*. 2.5.3.3 and 3.5.3.3 – 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. 3.5.2 Fuel See NBIC Part 1, Section 1.6.5, *Fuel*.	
c) Thread sealing compound resistant to LPG	No mention of thread sealing compound, etc. in NBIC Part 1, Installation.	No.

CF-130 – Filters or Strainers

CSD – 1 Summary	NBIC – Yes/No and words.	Should it cover
CF-130 – Filters or Strainers		

Filters or strainers are recommended in the main gas supply line.	Not mentioned.	Yes.

CF-140 – Sediment Traps and Drips

CSD – 1 Summary	NBIC – Yes/No and words.	Should it cover
CF-140 – Sediment Traps and Drips		
a) A sediment trap shall be installed before the controls. On a vertical. Manufacture supplies or specifies that the sediment trap is installed as close as practicable to the controls.	Also covered in NFGC NFPA 54 No mention of sediment traps and drips in NBIC Part 1, Installation.	Yes
b) If the gas is not dry, a drip shall be provided at any point where condensate could collect.	No – How do we know if its wet or dry	No

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CF-150 Manually Operated Gas shutoff valves

CF-150 Manually operated gas shutoff valves a) Unless provided as part of an assembly, each valve shall comply with ANSI, CSA, UL or a nationally recognized standard and be suitable	Not currently – Manually operated gas shutoff valves shall be provided and comply with a national standard and a symbol……	Yes
b) Manual shutoff valves shall be ball or lubricated plug type with stops.	Gas shut off valves shall be ball or lubricated plug type	Yes
c) Manually operated valves shall be T-handle or lever-handled with handle parallel to the gas flow when open and perpendicular when closed. Valve shall be accessible and indicate open/closed. Adequate size to be operated without using tools. Maintained and exercised in accordance with manufacturer's instructions.	Handles attached so the handle is parallel when open and perpendicular when closed. Valve shall be accessible and indicate open/closed. Adequate size.	Yes
d) Except as allowed in e) below the handle shall be permanently attached.	Similar to CF-150 d) and e) Handle permanently attached unless it creates a hazard. Handle can be **temporarily** (must be reattached before operator leaves) removed and	Yes Do we want to define temporarily[RA6].

	reattached, must be attached when open.	
e) A removable handle is permitted in certain conditions (creates a personnel hazard or obstruction). In these cases, the handle must meet all of the following: 1) Handle remains installed when valve is open 2) Handle can only be reattached so the handle is perpendicular to the flow in a closed position 3) Valve position is indicated, with or without handle 4) Upon removal, the handle must be turned and reattached180 deg to remove hazard or tethered no more than 3 ft away and usable trouble free without untethering 5) A handle tethered in 4) above shall only be permitted when the line is tagged/locked out to prevent operation	Do we want to go into this level of detail?	MAYBE [RA7]
f) A manually operated valve shall be provided upstream from all other main gas controls to isolate the fuel train 1) Valve shall be within 6 ft of the boiler and accessible from the floor 2) When a valve is not required per h), then the valve require by f) shall be located immediately external to the boiler/burner unit		Yes
g) When the pilot gas is obtained independently or upstream of the manual shutoff valve, a separate manual valve (per a-e) shall be located in the gas supply line to the pilot. When the pilot is downstream of f) one or more manual valves or other means to permit turndown tests and/or pressurization of the pilot without pressurizing the main fuel train.	But only on the pilot being independent or upstream of the manual shut off valve.	Yes
h) A manually operated shutoff valve in 1-e shall be provided after the downstream SSV to the main burner or group of burners if required by the boiler/burner mfgr for testing or maintenance.	How does the inspector know what the Mfgr requirements are.	No

I would suggest a paragraph in the following manner.

A manual valve is required upstream of all controls and within 6 ft of the boiler [RA8]to isolate the fuel train. If a pilot line is independent from the main gas train, it shall also have a manual valve. These manual valves shall be accessible from the floor and designed to be opened/closed without additional tools. They shall be valve ball or plug type with a non-removable handle that is perpendicular to the gas flow when closed and parallel when open. The handle can be temporarily removed if…. At all times, the position of the valve shall be indicated.

CF-160 – Gas pressure Regulators[RA9]

CF-160 Gas Pressure Regulators		
a) Individual Gas pressure regulators or regulators that are part of a combination valve shall be used for both the pilot and main gas per ANSI Z21.78/CSA 6.2. Regulated pressure shall be within +/- 10% set pressure at all firing rates. Pressure test port required	Do we need to specify equipment downstream of the gas shutoff valve or rely on the 1.6.5 and the reliance on an industry standard?	Committee Question
b) Regulators with integral vent limiters – meet ANSI Z21.18/CSA 6.3.		No
c) Second stage regulators for LPG gas (alone or in combo) must comply with UL 144 and installed per NFPA 58		No

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CF-161 – Overpressure Protection		
a) If the MAWP of any component is less than the entering gas pressure so a regulator failure would produce pressure above the MAWP, the downstream piping system shall have overpressure protection.	See CF 160	
b) If OP protection is require, it shall be located upstream of all controls for both the burner and the Pilot. OP devices shall be vented to safe point of discharge, if required.		

c) CG-210 is referenced. (NFPA 54 gas, NFPA 31 oil and NFPA 58 LP gas)		
d) OP, if required, may be provided by any device listed in the latest NFPA 54/ANSI Z223.1		

CF-162 – Gas Pressure Supervision		
a) Gas pressure supervision shall be provided based on heat input and firing system type (power, mech draft, pulse – or – natural draft.) to accomplish a safety shutdown and lockout in the event of either high or low gas pressure.	See CF 160	
b) Location 1) High pressure downstream of main regulator – Switch locks out before the manifold gas pressure exceeds a) The boiler/burner manufacturer's specified setting b) 150% of the boiler/burner main manifold gas pressure if not specified by manufacturer		
2) High pressure upstream of main regulator – the regulator must be a zero governor pressure regulator. The high pressure switch locks out when the supply pressure exceeds a) The setting of the OP protection device in CF 161 if equipped. b) The boiler/burner manufacturers specified setting c) 150% of the boiler/burner main manifold gas pressure if not specified by manufacturer		

A high gas pressure switch is not required when a boiler unit incorporates a listed shutoff valve with a zero governor pressure regulator that causes a safety shutdown if the zero governor pressure regulator fails due to a ruptured diaphragm		
c) Low gas pressure shall function to accomplish a safety shutdown before the main manifold gas pressure is less than 1 The boiler/burner manufacturer's specified setting 2 50% of the boiler/burner's main manifold gas pressure if the setting is not specified. The low gas pressure switch shall be located upstream of the SSVs. When the low gas-pressure switch is located upstream of the main gas-pressure regulator, the burner or boiler unit shall be labeled and listed by a nationally recognized testing agency for this arrangement.	See CF-160 No – Even if we do agree that switches should be included.	
d) Pressure test port(s) are required		
e) Gas-pressure switches shall be labeled and listed	As part of 1.6.5?	
f) Switches shall be capable of withstanding a pressure not less than 10% above the relieving pressure of the nearest upstream OP device. When no relief is provided, the switches shall be capable a pressure not less than the maximum inlet pressure of the nearest gas-pressure	No. Even in we do agree that switches should be included.	

regulator. When the high gas-pressure switch is located downstream of the SSV, the switch shall be capable of withstanding a pressure no less than 50% above it's upper set point limit.		
g) Gas-pressure switches of the automatic or manual reset type shall be electrically connected in accordance with CE-110(j)	No	

Part 1

CF-170 – Control Valves

CF – 170 – Control Valves		
a) An automatic input, complete closure, control valve may be combined with a SSV.	See CF 160	
b) A bypass valve may be installed only around a control valve, not any valve that is a shutoff		

CF-180 Safety Shutoff Valves (SSV)

CF-180 Safety Shutoff Valves (SSV)		
a) Each main and pilot shall have a SSV that is compliant with one of the ANSI/CSA or UL 429	See CF 160	
b) Single burners main burner supply line shall be equipped as follows 1) <= 500K, Two safety shutoff in series (can be single body) or one safety shutoff with a proof of closer interlock. If the two shutoff valves are in on body, they shall be in series with independently operated shafts 2) >= 500 K up to 12.5 million, Two SSVs in series that may be in a single valve body. At least one shall		

incorporate a proof of closure interlock. If the two shutoff valves are in on boy, they shall be in series with independently operated shafts 3) If there is a branch line to a second burner, either a or b following apply a. <500K b) 1) applies b. >500K up to 12.5 million – 1) Safety shutoff in b)1) applies to each branch or 2) At least one SSV on the main and one on the branch shall incorporate a proof of closure interlock		
c) For multiple burner units the main burner shall be equipped as follows 1) <= 500 k safety shut off in b)1) applies to each individual line 2) >500K up to 12.5 million, either of the following applies a. SSV requirements in b)2) applies to each line b. SSV requirements in b)1) apply to each line and the main burner supply line has at least one SSV with proof of closure interlock.		
d) The valve seal overtravel (proof of closure) interlock shall prevent boiler ignition if the switch does not prove the valve closed during the startup		
e) Pilot supply line shall be equipped with at least one SSV		
f) SSVs labeled, listed by a national…		
g) SSVs shall have a shutoff time not to exceed that specified in Tables CF1-4		
h) SSV's shall be capable of withstanding a pressure not less than 10% above closest upstream OP device. If no OP device, the valves can withstand a pressure not less than maximum inlet to regulator		
i) Provisions to independently test each SSV for seal leakage. Any special		

equipment made available to boiler/burner mfgr.		

CF-190 – Vent, Bleed, Gas-pressure relief, vent valve, and feedback LINES for fuel train components.

a) Vent Lines 1) Regulators, combination controls, pressure interlock switches and all components requiring atmosphere air pressure shall have the atmospheric side of the diaphragm connected to a vent line that shall be pipe outside to a safe point of discharge as determined by the AHJ unless allowed in c) or h) below. 2) Where there is more than one fuel train component requiring a vent, each component shall have a separate vent piped outside to the safe place of discharge (per AHJ) unless otherwise permitted by f) or h).	Yes. Maybe combine all into one paragraph.[RA10] Vent or bleed lines coming from gas equipment such as regulators, controls, etc. shall be vented outside to a safe point of discharge. Sizing of vents, manifolding etc. should be per the applicable accepted standard. Vent to safe point of discharge per the standard or the AHJ.	
b) Bleed lines 1) Regulators, combination controls, pressure interlock switches and all components requiring atmosphere air pressure and periodically release gas shall have the atmospheric side of the diaphragm connected to a bleed line that shall be piped outside to a safe point of discharge as determined by the AHJ unless allowed in c) or h) below. 2) Where there is more than one fuel train components requiring a bleed line at a location, each component shall have a separate bleed line piped outside to the safe place of discharge (per AHJ) unless otherwise permitted by f) or h).		
c) *Components with Vent Limiters.* A listed and labeled gas-pressure regulator, etc. or other fuel train component incorporating a vent limiter shall be permitted to vent directly into ambient space		

d) Gas-pressure relief lines 1) If an OP device incorporates a gas-pressure relief device, the outlet shall be connected to a relief line piped outside to the safe place of discharge (per AHJ) 2) The relief line shall be sized in accordance with the component manufacturer's instructions and shall be at least the same size as the outlet connection of the relief valve 3) Where there is more than one gas-pressure relief valve, each relief valve shall have a separate line piped outside to the safe place of discharge (per AHJ) unless otherwise permitted by f).		
e) Lines from vent valves 1) A vent valve, if installed shall be piped outdoors to a safepoint of discharge as determined by the AHJ 2) Vent line shall be >= to the outlet connection 3) Where there is more than one vent valve at a location, each vent valve shall be piped outside to the safe place of discharge (per AHJ) unless otherwise permitted by f).		
f) Manifolding of Lines If approved by the AHJ, same type lines (vent, bleed) shall be permitted and vent and bleed manifolding is permitted. To minimize backpressure, the manifolded line shall have a cross- sectional area of not less than the area of the largest branch line piped+ 50% of the additional cross-sectional areas. The following manifolding is not permitted 1) Gas-pressure relief with vent line, bleed lines or vent valve lines 2) Vent valve lines with vent lines or bleed lines 3) No vent lines of any type from one boiler to another		
g) Connecting lines to Flue Passages No vent lines of any type shall connect to a boilers flue passages		

h) Points of discharge: Outdoor requirements, special exceptions, and prohibited practices 1) Unless terminated per 2) or 4) all lines shall be piped outside to the safe place of discharge (per AHJ). The point of discharge shall be protected from foreign material. 2) A combination gas control integrating an internal gas bleed line shall be permitted to discharge its bleed line back into the valve body – if designed to not leak into burner. 3) If prone to floods, the discharge shall be protected (anti-flood or raise height) 4) A bleed or vent line can be discharged into a pilot if it is not a manifolded line and the discharge uses a burner tip. 5) Bleed or vent line shall not discharge into a positive pressure combustion chamber		
i) *Clearance for Points of Discharge* The point of discharge from the referenced vents piped outside shall have clearance as determined by the AHJ and the point of discharge shall extend above boiler and structures to prevent gaseous discharge from being drawn into combustion air intakes, ventilating systems, mechanical air intakes, windows of the boiler room or of an adjacent building.		
j) Burner tips 1) If used per h)4) – metal with a melting point of +1,450 F and its length shall extend from location in 3) to the outer wall of the combustion chamber. 2) Installer to document compliance and provide documention accompanying the boiler 3) Burner tip location shall be located so the gas is readily ignited and the tips securely held in relation to the pilot.		

k)	*Feedback Lines for Fuel Train components* Feedback lines – Piped per manufacturer's instructions		
l)	*Bleed, Vent, and Relief lines* All materials for these lines must be strong and durable enough and suitable for the environmental stresses. Materials shall be listed for intended purpose by a nationally recognized standard as accepted by the AHJ. In the absence of a standard NFPA 54 shall be used.		

Reminder

FROM NBIC PART 1

1.4.1 RESPONSIBILITY

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

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

1) Verify the *Boiler Installation Report* (I-1 Report) has been completed and signed by the installer, when required by the Jurisdiction;
2) Verify pressure-retaining items comply with the laws and regulations of the Jurisdiction governing
the specific type of boiler or pressure vessel;
3) Verify any repairs or alterations to pressure-retaining items, which are conducted prior to, or during,
the initial installation, are in accordance with the NBIC;
4) Request or assign jurisdictional identification number, when required by the Jurisdiction; and
5) Complete and submit the first inservice inspection/certificate report to the Jurisdiction when required
by the Jurisdiction.

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

Item Number: 20-41

ASME CSD-1 2018 Edition

CW-510 Requirements for Steam and Hot-Water Heating Boilers

The safety and safety relief valves of all steam and hot-water heating boilers shall conform to the ASME Boiler and Pressure Vessel Code, Section I or Section IV, as applicable.

NBIC Part I 2019 Edition

2.9.1 (~~c~~b[TB1]) Pressure relief valve shall be manufactured in accordance with a national or international standard and be certified for capacity ~~or flow resistance~~ [TB2]by the National Board.

3.9.2 ~~(a)~~ [TB3]Pressure Relief Valve requirements for steam heating boilers

(a) Pressure relief valve shall be manufactured in accordance with a national or international standard and be certified for capacity ~~or flow resistance~~ [TB4]by the National Board.

NBIC Part 4 2019 Edition

2.2.1b) Pressure relief valves shall be manufactured in accordance with a national or international standard and be certified for capacity by the National Board.

2.4.2 a) Pressure relief valves shall be manufactured in accordance with a national or international standard and be certified for capacity by the National Board.

Item Number: 20-43

ASME CSD-1 2018 Edition

CW-510 Requirements for Hot-Water Supply Boilers

The safety and safety relief valves of all hot-water supply boilers shall conform to the ASME Boiler and Pressure Vessel Code, Section I or Section IV, as applicable.

Part 1, 2019 Ed.

3.9.3 (a) Pressure relief valve shall be manufactured in accordance with a national or international standard and be certified for capacity ~~or flow resistance~~ [TB1] by the National Board.

Part 4, 2019 Ed.

2.4.3 a) Pressure relief valves shall be manufactured in accordance with a national or international standard and be certified for capacity by the National Board.

It is intended that the number be **3.8.1.7** and that the item currently **3.8.1.7** becomes **3.8.1.8**

3.8.1.7 Vacuum Boilers

Vacuum Boilers shall be provided with instruments, fittings and controls in accordance with Section 3.8 but are exempt from the following requirements if pressure and temperature controls are installed as described in 3.8.1.7 below:

3.8.1.2	Water-Gage Glasses
3.8.1.3	Water Column and Water Level Control Piping
3.8.1.4	Pressure Control
3.8.1.5	Auto Low Water Cut-Off and /or Water feeding device
3.7.7	Blow Off and Drain Valves

The exemptions are allowed only when the following controls are installed:

a) Pressure Control – Each boiler shall have a pressure control that interrupts the burner operation in response to boiler pressure. This pressure control shall be set from 2.5 psig (17 kpa) to 14.7 psig (101 kpa).
b) Temperature Control- Each boiler shall have two temperature controls responsive to boiler temperature that interrupt burner operation. One shall operate at a temperature below 210'F (99'C). The other shall at a temperature not exceeding 210'F (99'C) and shall cause a safety shutdown and lockout.
c) Safety Relief Valves - Each boiler shall have a properly sized safety valve and shall conform to the following.
   1. Have no test lever
   2. Be set to a maximum pressure of 7.1 psig (49 kpa).
   3. ASME Boiler and Pressure Vessel Code Section IV

References:
CSD-1 CW-700
CW 710
ASME Sec IV Mandatory Appendix 5 Vacuum Boilers
5-300 Design Parameters and 5-600 Instruments, Fittings and Controls

NBIC Item # 20-86

NBIC Location: Part 1, 2.10.1 a) Testing and Acceptance: Boil Out

Recommended Verbiage – DP 1/14/21

It is recommended that a newly installed boiler(s) be boiled out. Its internal surfaces could be fouled with oil, grease, and/or other protective coatings from the manufacturing of the boiler. Boiling out will also remove any remaining mill scale, rust, welding flux, or other foreign matter normally associated with manufacturing or shipment. All contamination needs to be removed since it lowers the heat transfer rate and could cause localized overheating.

Existing boilers that have had any tube replacement, re-rolling or other extensive repairs to the pressure parts should also be boiled out. The lubricant used for rolling tubes, plus the protective coating on the new tubes, must be removed by boiling out before the repaired boiler can be put back on the line.

There are several methods used to perform the boil out operation. The boil out chemicals that are added to the water create a highly caustic solution, which upon heating dissolves the oils and greases and takes them into solution. After the period of boil out and blowing down the boiler, the concentration is diluted enough that practically all the oils and greases and other matter have been eliminated.

For new system installed the condensate return from the system should be dumped as this piping could also contain contaminants that could result in being put back into the boiler(s). The time for this should be determined on the size of the system.

Refer to the manufacturer and/or a chemical treatment company or specialist for the recommended chemicals and procedure to follow.

January 4, 2022

Subject: NBIC Part 1, 3.7.5.1 b) – Isolation Valve Requirements

To whom it may concern:

The Lochinvar AQUAS is a factory assembled "package" that incorporates a Lochinvar boiler and a separate heat exchanger. These packages are designed to indirectly heat a swimming pool or spa.

Part HG-710 of Section IV of the ASME Boiler and Pressure Vessel code addresses the requirement for Stop Valves. Part HG-710.2 specifically addresses "Single Hot Water Heating Boilers".

Part HG-710.2 (b) states the following: *When the boiler is located above the system and can be drained without draining the system, stop valves may be eliminated*

With an AQUAS package, the "system" is a stand-alone heat exchanger that is mounted on the skid below the level of the boiler. Therefore, Lochinvar AQUAS packages are not required to be equipped with isolation (stop) valves installed in the piping between the boiler and the heat exchanger because the boiler can be drained without draining the system (heat exchanger).

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

a) For Single Steam Heating Boilers

When a stop valve is used in the supply pipe connection of a single steam boiler, there shall be one installed in the return pipe connection.

b) For Single Hot-Water Heating & Hot-Water Supply Boilers

1) Stop valves shall be located at an accessible point in the supply and return pipe connections as near the boiler as is convenient and practicable, of a single hot water boiler installation to permit draining the boiler without emptying the system.

2) ~~When the boiler is located above the system and can be drained without draining the system stop valves required in NBIC Part 1, 3.7.5.1 b) 1) may be eliminated.~~ The stop valves required in NBIC Part 1, 3.7.5.1 b) 1) may be eliminated when the boiler can be drained without draining the system. Means to allow draining the boiler without emptying the system may include installation of the boiler above the system or isolation of the boiler from the system by equipment.

c) For Multiple Boiler Installations

A stop valve shall be used in each supply- and-return pipe connection of two or more boilers connected to a common system. See NBIC Part 1, Figures 3.7.5.1-a, 3.7.5.1-b, and 3.7.5.1-c.

Getter	Jim	Manufacturers	Chair	07/30/2024	Details
Horbaczewski	Mark	Users	Vice Chair	07/30/2024	Details
Metzmaier	Jodi		Secretary	01/30/2099	Details
Barker	Timothy	Authorized Inspection Agencies	Member	01/30/2024	Details
Brantley	Ernest	Authorized Inspection Agencies	Member	01/30/2022	Details
Buechel	David	Authorized Inspection Agencies	Member	07/30/2022	Details
Calvert	James	National Board Certificate Holders	Member	07/30/2024	Details
Clark	James	Manufacturers	Member	07/30/2022	Details
Graf	Darrell	National Board Certificate Holders	Member	01/30/2023	Details
Hackworth	William	Authorized Inspection Agencies	Member	07/30/2024	Details
Jessick	Jerry	Users	Member	07/30/2024	Details
LeSage	Donnie	Jurisdictional Authorities	Member	07/30/2023	Details
Mangas	John	General Interest	Member	07/30/2024	Details
Morgan	Joseph	Users	Member	07/30/2024	Details
Newton	Venus	Authorized Inspection Agencies	Member	07/30/2022	Details
Petersen	Jeffrey	Users	Member	01/30/2023	Details
Ray	Brent	Users	Member	07/30/2023	Details
Roberts	James	Manufacturers	Member	08/30/2023	Details
Rose	David	Users	Member	10/30/2022	Details
Safarz	Jason	General Interest	Member	07/30/2023	Details
Sansone	Matthew	Jurisdictional Authorities	Member	01/30/2024	Details
Scarcella	Vincent	Authorized Inspection Agencies	Member	01/30/2023	Details
Vandini	Thomas	National Board Certificate Holders	Member	01/30/2023	Details

PROPOSED INTERPRETATION

Item No.

21-65

Subject/Title

Air receiver tank manual drain valve

Project Manager and Task Group

Source (Name/Email)

Luciano Tuason / Luciano.Tuason@tuvsud.com

Statement of Need

In preparing an inspection of a Texas cement plant, I put this requirement indicated in my proposed reply above.

Background Information

I remember this requirement some 12 years ago, but I could no longer find the specific code requirement. The client want to know where and what code provide this requirement.

Proposed Question

Is the requirement for air receiver tank manual drain valve mandatory even if the system has an automatic condensate drain?

Proposed Reply

Yes.

Committee's Question 1

Committee's Reply 1

Rationale

Committee's Question 2

Committee's Reply 2

Rationale

PROPOSED REVISION OR ADDITION

Item No.

A 21-48

Subject/Title

Correction of references in S2.6.3.4 a) 1) and 2).

NBIC Location

Part: Inspection; Section: S2.6.3.4; Paragraph: a) & 1) & 2)

Project Manager and Task Group

Source (Name/Email)

John Cady / john.cady@state.mn.us

Statement of Need

the sentences in S2.6.2 (b&c) were re-lettered sometime between 2013 and 2019 and the references back to them in S2.6.3.4 were not changed at the same time. This also applies to S2.6.3.4 a) 1 & 2. This correction may be needed in other sentences but I have not identified the need yet.

Background Information

The grid sizes referred to in S2.6.3.4 are in S2.6.2 b & c and not c & d.

Existing Text	Proposed Text
The remaining thickness may be averaged over an area not exceeding the UT-grid size specified in S2.6.2 c) or S2.6.2.d).	The remaining thickness may be averaged over an area not exceeding the UT-grid size specified in S2.6.2 b) or S2.6.2 c).

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

PROPOSED REVISION OR ADDITION

Item No.

A 21-66

Subject/Title

Correct Water Treatment

NBIC Location

Part: Inspection; Section: Supplement 2; Paragraph: S2.7.3.2 c)1)c.

Project Manager and Task Group

Source (Name/Email)

Mohamed Elsayed / mohamed.elsayed@gov.mb.ca

Statement of Need

As a jurisdiction we would like to define a process for treating the water that is used in historical boilers. Historical boiler owners in the province of Manitoba are stating that corrosion inhibitors do not have a noticeable capacity for slowing the effects of corrosive compounds in non treated water.

Background Information

The request for this interpretation is triggered from a discussion with historical boiler owners in the province of Manitoba. The owners are requesting a clarification for what the expectations are for treating the water used in the historical boilers.

Existing Text	Proposed Text
N/A	Please provide a definition/requirements for treated water used in historical boilers.

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

Item #20-70 **Proposal V2**

Task Group Locomotive Boilers

Summary

Many steam locomotive operators do not inspect the sliding firebox supports on their locomotives (when they are equipped). Inspections have found them to be rusted in-place causing breakage of connection bolts and other damage to the locomotive firebox and mudring.

Furnace slide supports which are locked in-place by corrosion will adversely impact the thermal expansion of the boiler and lead to staybolt breakage.

Proposal

S1.4.2.29 BOILER ATTACHMENT BRACKETS

The boiler attachment brackets and associated components and fasteners used to secure the boiler to the frame shall be inspected for:

a) Correct installation;
b) Damaged or missing components;
c) Looseness;
d) Leakage;
e) Loose, bent, broken, or damaged rivets, nuts, bolts and studs;
f) Defective rivets;
g) Provision for expansion; and free movement of ~~sliding~~ supports.
~~h) Corrosion which may preclude free movement of sliding supports.~~

SUPPLEMENT 5
INSPECTION OF YANKEE DRYERS ~~(ROTATING CAST-IRON PRESSURE VESSELS) WITH FINISHED SHELL OUTER SURFACES~~

S5.1 SCOPE

This supplement provides guidelines for the in service inspection of a ~~Yankee~~yankee dryer as defined in NBIC Part 1 Supplement 1. ~~A Yankee dryer is a pressure vessel with the following characteristics:~~

a) A yankee dryer is a rotating steam-pressurized cylindrical vessel commonly used in the paper industry. It is characterized by a center shaft connecting the heads. While traditionally made of cast iron, bolted or welded steel vessels are in use.

~~a)~~b) Yankee dryers are primarily used in the production of tissue-type paper products. When used to produce machine-glazed (MG) paper, the dryer is termed an MG cylinder. A wet paper web is pressed onto the finished dryer surface using one or two pressure (pressing) rolls. Paper is dried through a combination of mechanical dewatering by the pressure roll(s); thermal drying by the pressurized ~~Yankee~~yankee dryer; and a steam-heated or fuel-fired hood. After drying, the paper web is removed from the dryer.

~~b)~~c) The dryer is typically manufactured in a range of outside diameters from 8 to 23 ft. (2.4 m to 7 m), widths from 8 to 28 ft. (2.4 m to 8.5 m), pressurized and heated with steam up to 160 psi (1,100 kPa), and rotated at speeds up to 7,000 ft./min (2,135 m/min). Typical pressure roll loads against the ~~Yankee~~yankee dryer are up to 600 pounds per linear inch (105 kN/m). A thermal load results from the drying process due to difference in temperature between internal and external shell surfaces. The dryer has an internal system to remove steam and condensate. These vessels can weigh up to 220 tons (200 tonnes).

~~c)~~d) The typical ~~Yankee~~yankee dryer is an assembly of several large castings. The shell is normally a gray iron casting, in accordance with ASME designation SA-278. Shells internally may be smooth bore or ribbed. Heads, center shafts, and journals may be gray cast iron, ductile cast iron, or steel.

S5.2 ASSESSMENT OF INSTALLATION

a) The Inspector verifies that the owner or user is properly controlling the operating conditions of the dryer. ~~The Inspector does this by reviewing the owner's comprehensive assessments of the complete installation, operating environment, maintenance, and operating history.~~

b) The dryer is subjected to a variety of loads over its life. Some of the loads exist individually, while others are combined. Consideration of all the loads that can exist on a ~~Yankee~~yankee dryer is required to determine the maximum allowable operating parameters. There are four loads that combine during normal operation to create the maximum operating stresses, usually on the outside surface of the shell at the axial center line. These are:

1) Pressure load due to internal steam pressure;

2) Inertial load due to dryer rotation;

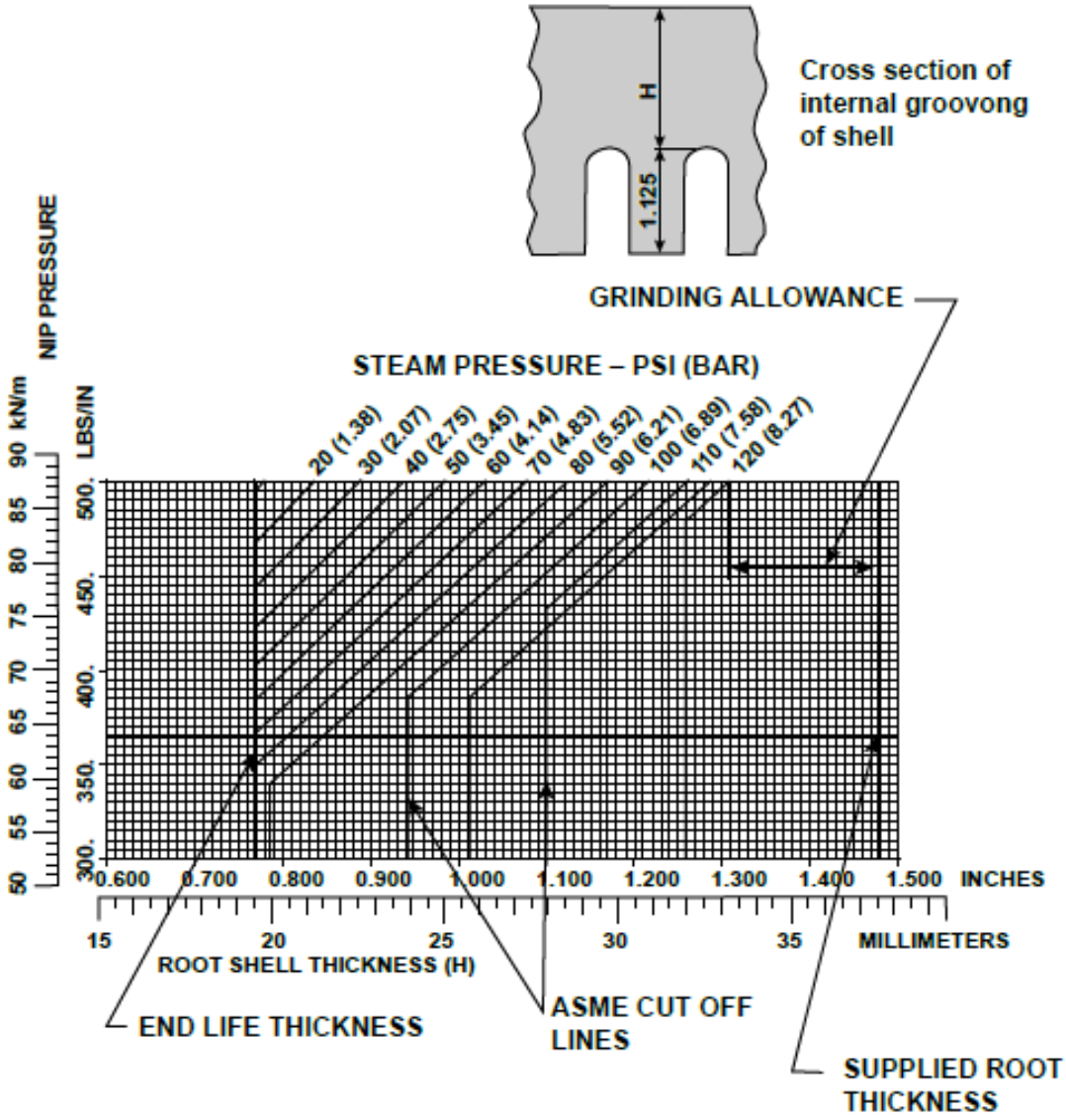
3) Thermal gradient load due to the drying of the web; and

4) Pressure roll load (line or nip load) due to pressing the wet web onto the dryer.

c) Steam pressure, inertial, and thermal gradient loads impose steady-state stresses. These stresses typically change when the dryer shell thickness (effective thickness for ribbed dryers) is reduced to

restore a paper-making surface, the grade of tissue is ~~changed~~changed, or speed of the dryer is changed.

~~FIGURE S5.2~~
~~DE-RATE CURVE~~



d) The pressure roll(s) load imposes an alternating stress on the shell face. The resulting maximum stress is dependent on the magnitude of the alternating and steady-state stresses.

e) ASME Section VIII, Div. 1, only provides specific requirements for the analysis of pressure loads. Although the code requires analysis of other loads, no specific guidance for thermal, inertial, or pressure roll loads is provided. Hence, additional criteria must be applied by the manufacturer to account for all the steady-state and alternating stresses.

f) To maintain product quality, the dryer surface is periodically refurbished by grinding. This results in shell thickness reduction. Therefore, the manufacturer does not provide a single set of maximum

allowable operating parameters relating steam pressure, rotational speed, and pressure roll load for a single design shell thickness. The manufacturer, or another qualified source acceptable to the Inspector, instead provides a series of curves that graphically defines these maximum allowable operating parameters across a range of shell thicknesses. This document is known as the “De-Rate Curve.” See NBIC Part 2, Figure S5.2. In cases where no derate curve is provided the manufacturer, or another qualified source, may provide a set of operating conditions and a minimum shell thickness.

g) Yankee dryers may be spray-coated with metallizing materials to extend and improve dryer operations. Metallizing is almost always sprayed onto the exterior of a steel shell. Metallizing may be sprayed onto the exterior of a cast iron shell. Metallizing provides a more wear-resistant surface. Typically, a metallized coating is ground several times before it is removed from the shell. If the dryer needs to be re-sprayed with metallizing, the steel or cast iron is lightly ground and then re-sprayed. The grinding of the shell material results in a shell thickness reduction which needs evaluation for any necessary pressure and safety device re-settings.

~~a)~~h) In addition to the loads on the dryer due to normal operation, other nonstandard load events can occur. These nonstandard load events should be recorded in an operation or maintenance log. Examples of nonstandard load events include:

1) ~~Excessive thermal load due to local or global heating rate during warm-up~~Local or overall thermal loads due to exceeding the warm-up rate;

2) ~~Excessive thermal load due to local or global cooling rate during shut-down~~Local or overall thermal loads due to exceeding the cool-down rate;

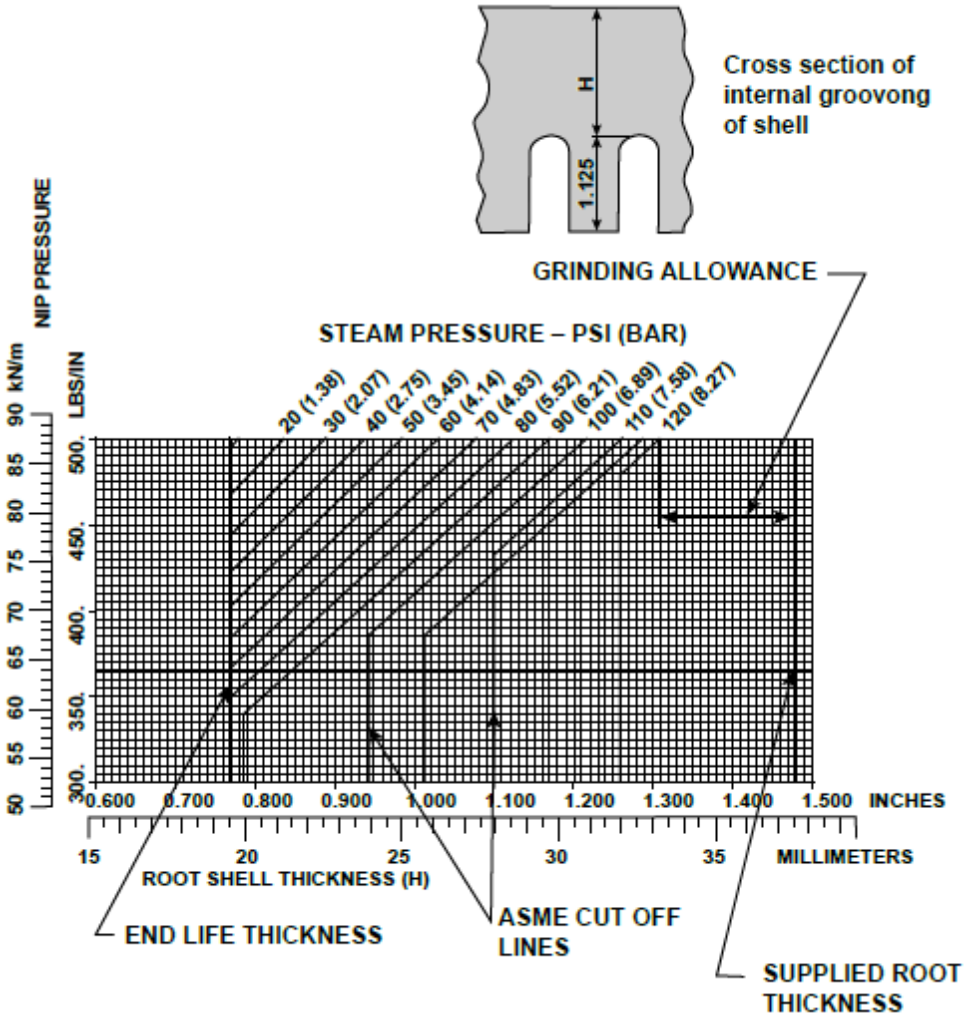
3) ~~Excessive t~~Thermal load due to inappropriate use or malfunctioning auxiliary heating devices causing localized heating;

4) ~~Excessive t~~Thermal load due to the misapplication or uncontrolled application of water or other fluids for production, cleaning, or ~~fire fighting~~firefighting; and

5) Impact load.

~~b)~~i) If nonstandard load events have occurred, then the Inspector should ensure that an appropriate ~~risk based~~risk-based assessment of the ~~structural integrity on the~~ dryer has been performed.

FIGURE S5.2
DE-RATE CURVE



S5.2.1 DETERMINATION OF ALLOWABLE OPERATING PARAMETERS

a) A ~~Yankee~~yankee dryer is designed and intended to have its shell thickness reduced over the life of the vessel through routine wear and grinding. The ~~Yankee~~yankee dryer shell is ground on the outside surface to restore the quality or shape of the papermaking surface, essential to the manufacturing of tissue or other paper products.

b) Design documentation is required that dictates the maximum allowable operating parameters as shell thickness is reduced. Calculations used to determine those parameters are in accordance with ASME Code requirements for primary membrane stress and design criteria based upon other relevant stress categories; (e.g., fatigue and maximum principal stress). Calculation of these parameters requires that the respective stresses, resulting from the imposed loads, be compared to the appropriate material strength properties. Hence, knowledge of the applied stresses in the shell and the tensile and fatigue properties of the material are essential.

c) Yankee dryers are subjected to a variety of loads that create several categories of stress. Yankee dryers are designed such that the stress of greatest concern typically occurs on the outside surface at the axial centerline of the shell.

1) Steam Pressure Load — The internal steam pressure is one of the principal design loads applied to the ~~Yankee~~yankee dryer. The steam pressure expands the shell radially, causing a predominately circumferential membrane tensile stress. Because the shell is constrained radially by the heads at either end of the shell, the steam pressure also causes a primary bending stress in the vicinity of the head-to-shell joint. The ends of the shell are in tension on the inside and compression on the outside due to the steam pressure. The steam pressure also causes a bending stress in the heads.

2) Inertia Load — The rotation of the ~~Yankee~~yankee dryer causes a circumferential membrane stress in the shell similar to that caused by the steam pressure load. This stress is included in the design of the shell and increases with dryer diameter and speed.

3) Thermal Gradient Load — The wet sheet, applied to the shell, causes the outside surface to cool and creates a thermal gradient through the shell wall. This thermal gradient results in the outside surface being in tension and the inside surface in compression. With this cooling, the average shell temperature is less than the head temperature, which creates bending stresses on the ends of the shell and in the heads. The ends of the shell are in tension on the outside and compression on the inside.

a. Other thermal loading also occurs on a ~~Yankee~~yankee dryer. The use of full width showers for a variety of papermaking purposes affects the shell similar to a wet sheet. The use of edge sprays produces high bending stress in the ends of the shell due to the mechanical restraint of the heads.

b. Warm-up, cool-down, hot air impingement from the hood, moisture profiling devices, ~~fire fighting~~firefighting, and wash-up can all produce non-uniform thermal stresses in the pressure-containing parts of the ~~Yankee~~yankee dryer. Heating or cooling different portions of the ~~Yankee~~yankee dryer at different rates causes these non-uniform stresses.

4) Line Load — The line load from the contacting pressure roll(s) results in an alternating, high cycle, bending stress in the shell. This stress is greatest at the centerline of the shell. The load of the pressure roll deflects the shell radially inward causing a circumferential compressive stress on the outside surface and a tensile stress on the inside. Because the shell has been deflected inward at the pressure roll nip, it bulges outward about 30 degrees on each side of the nip. The outward bulge causes a tensile stress on the outside shell surface at that location and a corresponding compressive stress on the inside. Since the shell is passing under the pressure roll, its surface is subjected to an alternating load every revolution.

S5.2.2 ~~ADJUSTING THE MAXIMUM~~ ALLOWABLE OPERATING PARAMETERS ~~OF THE YANKEE DRYER DUE TO A REDUCTION IN SHELL THICKNESS FROM GRINDING OR MACHINING~~ AND SHELL THICKNESS

a) The maximum allowable operating parameters are a function of shell thickness and are addressed in one of the following two manners in the industry.

1) Adjusted throughout life of dryer

The maximum allowable operating parameters are reduced throughout the life of the dryer as the shell thickness is reduced. This method is commonly used for cast iron shells.

Required design documentation called a de-rate curve dictates the maximum allowable operating parameters based on imposed loads over a range of shell thicknesses. The documentation shall be obtained from the original dryer manufacturer or from another qualified source acceptable to the Inspector.

After the maximum allowable operating parameters are adjusted per the de-rate curve, the appropriate load limiting devices are reset (e.g., steam safety relief valve, line load limiting device).

2) Held constant throughout life of dryer

The maximum allowable operating parameters are held constant throughout the life of the dryer, until the shell thickness is reduced to a minimum end-of-life value. This method is commonly used for steel shells.

Required design documentation dictates the maximum allowable operating parameters and the minimum shell thickness. The documentation shall be obtained from the original dryer manufacturer or from another qualified source acceptable to the Inspector.

b) The current shell thickness and maximum allowable operating conditions shall be documented throughout the life of the ~~Yankee~~yankee dryer.

~~a) The outside surface of the Yankee dryer shell is routinely ground to restore the quality of the papermaking surface. The papermaking surface degrades due to wear, corrosion, and local thinning. As the shell thickness is reduced, the maximum allowable operating parameters are adjusted. Adjustment of the maximum allowable operating parameters requires accurate shell thickness measurements.~~

~~b) Over the life of the Yankee dryer, the adjustment of the maximum allowable operating parameters will require that the original design pressure and/or the pressure roll line load be reduced. After the maximum allowable operating parameters are adjusted per the De-rate Curve, the appropriate load limiting devices are reset (e.g., steam safety relief valve, line load limiting device).~~

~~S5.2.3 DOCUMENTATION OF SHELL THICKNESS AND ADJUSTED MAXIMUM ALLOWABLE OPERATING PARAMETERS~~ (21)

~~a) Design documentation, a De-rate Curve, is required, which dictates the maximum allowable operating parameters, based on imposed loads over a range of shell thickness. The documentation shall be obtained from the original dryer manufacturer or from another qualified source acceptable to the Inspector.~~

~~b) Yankee dryer shell grinding requires accurate shell thickness measurements in conjunction with the Derate Curve in order to set load-limiting devices. The resulting shell thickness and maximum allowable operating parameters after grinding shall be documented, and the Inspector notified that load-limiting device settings have changed.~~

S5.3 ~~CAUSES OF~~ DETERIORATION AND DAMAGE

Three types of deterioration or damage typically encountered in ~~Yankee~~yankee dryers are local thinning, cracking, and corrosion. Many times, the mechanisms are interrelated, one being the precursor of another.

S5.3.1 LOCAL THINNING

a) Internally, a Local Thin Area (LTA) can occur on the pressure-retaining surfaces due to steam and condensate erosion, mechanical wear and impact, and removal of material flaws. These assume

features ranging from broad shallow areas washed out by erosion, to more groove-like flaws, including gouges and indentations from contacting metal parts.

b) Externally, the process is typically one of wear-corrosion in circumferential bands. Except on the shell edges, local thinning never achieves significant depth because the papermaking process will tolerate only the smallest departure from surface contour. On the shell edges, beyond the papermaking surface, wear-corrosion may advance to comparatively greater depths. However, the stresses are far less in this area than under the papermaking surface, so the wear is inconsequential in considerations of load-carrying ability. Only in the instance of steam leakage between flanges has the resultant local thinning ever been implicated in ~~Yankee~~yankee failure.

c) Steam leakage is detrimental to the long-term structural integrity of the vessel, in that the escaping steam, under high velocity, erodes ever-widening paths in the ~~cast-iron~~ surfaces over which it passes, thinning the cross-section. Steam cutting of connecting bolts is another possible outcome. Either result reduces load-carrying capacity of the part. A safety hazard can also be created for operating personnel, who may be burned by the high-velocity steam jets.

~~d) Interface leakage, including joints and bolted connections.~~

~~1) Joint Interface Corrosion~~

~~Jacking forces, which develop from the expansion of corrosion products between head-to-shell flanges, cause flange separation and create leakage paths between the flanges and/or through the bolt holes.~~

~~2) Insufficient Joint Clamping Force~~

~~Through inadequate design, improper assembly, loss of washer/gasket, or stress corrosion cracking of connecting bolts, the clamping force between mating flanges is insufficient to retain internal pressure.~~

~~3) Washer/Gasket Functional Loss~~

~~Deterioration, caused by corrosion or expulsion, provides a path for escaping steam and condensate.~~

~~4) Flange Machining Variation~~

~~Variations in surface contour of flange faces may create leakage paths.~~

~~e) Through-Wall Leakage~~

~~Cast iron inherently exhibits shrinkage porosity. Where porosity linkages occur between internal and external surfaces, a path for steam leakage is made available. Such leakage is largely an operational issue, as holes are formed in the paper product, demanding expedient attention.~~

S5.3.2 CRACKING

~~Cracks in cast-iron parts are problematic because of the relatively low fracture toughness compared with standard, more ductile pressure vessel materials and because strengthening repair through welding is prohibited. Furthermore,~~ Yankee dryers are subject to both low-cycle and high-cycle fatigue loading~~; c. C~~onsequently, considerable emphasis is placed upon ~~quality inspection for~~crack detection and timely remediation of cracks~~, the central causes of which (in Yankee dryers) are:~~. Possible causes include:

S5.3.2.0 EXCEEDING MAXIMUM ALLOWABLE OPERATING CONDITIONS

~~a) Overpressurization~~

~~As shell thickness is routinely diminished through time,~~ Yankee dryers are designed to operate within the ~~pressure~~ limitations set down by ASME Section VIII and the safety factors inherent to the ~~"De-rate Curve" calculated~~documentation provided by the vessel manufacturer or equally qualified source. Failure to maintain operation within the ~~steam pressure~~parameters established by those criteria can ~~, in the extreme,~~ lead to cracking.

~~b) Pressure Roll Overload~~

~~Included in Yankee dryer shell design is a fatigue factor of safety. Exceeding allowable roll load, in combination with other stress-elevating or strength-reducing conditions, can precipitate fatigue cracking and failure.~~

S5.3.2.1 ~~THROUGH~~ JOINTS AND BOLTED CONNECTIONS

a) Joint Interface Corrosion

Jacking forces, which develop from the expansion of corrosion products between head-to-shell flanges, cause flange separation and create leakage paths between the flanges and/or through the bolt holes. The products of corrosion occupy a larger volume than the base metal. The forces created by this expansion are sufficient to cause cracking in flanges or bolts. Without remediation, expansion will continue until failure occurs. Corrosion products form in the presence of moisture in the crevice created between flanges, wherever the clamping force is insufficient to maintain contact between the mating surfaces. ~~Jacking forces, which develop from the expansion of corrosion products between head-to-shell flanges, cause flange separation and create leakage paths between the flanges and/or through the bolt holes.~~

b) Insufficient Joint Clamping Force

Through inadequate design, improper assembly, loss of washer/gasket, or stress corrosion cracking of connecting bolts, the clamping force between mating flanges is insufficient to retain internal pressure.

c) Washer/Gasket Functional Loss

Deterioration, caused by corrosion or ~~expulsion~~gasket damage, provides a path for escaping steam and condensate.

d) Flange Machining Variation

Variations in surface contour of flange faces may create leakage paths.

S5.3.2.2 THROUGH-WALL LEAKAGE

Cast iron inherently exhibits shrinkage porosity. Where porosity linkages occur between internal and external surfaces, a path for steam leakage is made available. Such leakage in a cast iron~~the~~ shell is largely an operational issue, as holes are formed in the paper product, demanding expedient attention. Steel shells are not cast, and any through-wall leakage would likely be due to a through-wall crack which should be addressed immediately.

S5.3.2.3 IMPACT FROM OBJECTS PASSING THROUGH THE ~~YANKEE/~~PRESS~~URE ROLL~~ NIP

An object passing through the nip can create a localized impact that leads to elevated stress within fatigue loaded material.
~~Because of cast iron's low fracture toughness, it is especially intolerant of local, high-impact loads.~~

S5.3.2.4 STRESS MAGNIFICATION AROUND DRILLED HOLES

Surface defects, caused by porosity and indentations, are frequently repaired with driven plugs, having some level of interference fit. Pumping ports, threaded for a tapered pipe fitting, are often installed as a standard ~~Yankee~~yankee design feature for sealant injection into flange interfaces. When installed, both produce an area of increased stress, local to the hole's edge. In the case of driven plugs, this stress can be exaggerated by excessive interference fits and by closely-grouped or overlapping plugs. Over-torque of threaded, tapered plugs can cause cracks to develop at the periphery of the hole.

S5.3.2.5 ~~THERMAL STRESS AND/OR MICRO-STRUCTURAL CHANGE FROM~~ EXCESSIVE LOCAL HEATING AND COOLING

Transient thermal stresses are usually the highest encountered by a ~~Yankee~~yankee dryer. Temperature differential through and between parts can be of such magnitude as to exceed the strength of the material. When abnormal thermal loads occur, nondestructive examination is crucial to ensure the vessel's fitness-for-service. Micro-structural change and transient thermal stresses, sufficiently high to cause cracking in ~~Yankee~~yankee dryers, have resulted, or could result, from:

a) Bearing failure;

b) Rapid warm-up;

c) Excessive steam temperature;

d) Heat from fires;

e) Application of water sprays to fight fires and remove paper jams;

f) Continuous and excessive local cooling from water sprays;

g) Operating heating or cooling systems while the ~~Yankee~~yankee dryer is stationary; (e.g., high-temperature air impingement hoods, infra-red heating devices, coating showers);

h) Welding and electrical arcs ~~on cast-iron parts; and~~

i) Excessive local temperature due to improper thermal spray application.

~~S5.3.2.6 JOINT INTERFACE CORROSION~~

~~The products of corrosion occupy a larger volume than the base metal. The forces created by this expansion are sufficient to cause cracking in cast-iron flanges. Without remediation, expansion will continue until failure occurs. Corrosion products form in the presence of moisture in the crevice created between flanges, wherever the clamping force is insufficient to maintain contact between the mating surfaces.~~

S5.3.2.~~6~~7 STRESS-CORROSION CRACKING OF STRUCTURAL BOLTS

Stress-corrosion cracking (SCC) is the result of the combination of a corroding agent, material sensitivity, tensile stress, and temperature. At stress levels sufficiently high to induce SCC in the presence of a corrosive medium, attack proceeds along or through grain boundaries perpendicular to the direction of maximum tensile stress. Cracking can initiate with little or no evidence of general corrosion.

S5.3.3 CORROSION

Corrosion culminates with a failure in component functionality by diminishing load-carrying capacity or by generating forces beyond the material's strength. In addition to SCC, corrosion-jacking of joints ~~(head-to-shell joint)~~, wear-corrosion, and deterioration of washers described above, oxygen pitting, and general corrosion wastage need to be considered as potential failure causes. These latter two corrosion conditions are the result of inadequate boiler water treatment. ~~Oxygen pitting has been encountered, but rarely.~~

S5.4 INSPECTIONS

a) ~~Yankee dryers should be inspected on a routine-periodic basis. However, as a minimum, T~~the ~~Yankee~~yankee dryer should be inspected internally and externally at least one time every two years. The degree and frequency of inspection should be determined based on OEM recommendations, owner/user experience, and risk-based considerations.

b) As appropriate, the following items should be included depending on material of construction and design:~~:~~

1) Head-to-shell joint;

2) Shell out-of-roundness;

3) Shell centerline thickness;

4) Tilt of head flange;

5) Integrity and security of internal parts;

6) Spigot fit of flanged joints (head-to-shell, head-to-journal);

7) Integrity of structural bolts and studs; ~~and~~

8) Previously identified areas of deterioration and damage; and~~.~~

9) Welds within pressure-retaining items.

~~1) Head-to-shell joint;~~

~~2)1)Shell out-of-roundness;~~

~~3)1)Shell centerline thickness;~~

~~4)1)Tilt of head flange;~~

~~5)1)Integrity and security of internal parts;~~

~~6)1)Spigot fit of flanged joints (head-to-shell, head-to-journal);~~

~~7)1)Integrity of structural bolts and studs; and~~

~~8)1)Previously identified areas of deterioration and damage.~~

c) When a nonstandard load event occurs, or a material non-conformity is noted, an inspection should be performed to assess fitness for continued service. This inspection may involve testing methods not typically used in routine inspections and may also involve removal of material samples for destructive testing.

S5.5 NONDESTRUCTIVE EXAMINATION

a) Nondestructive examination (NDE) methods shall be implemented by individuals qualified and experienced with the material to be tested using written NDE procedures. For cast ~~Yankee~~yankee dryers, cast-iron knowledge and experience are essential.

b) Typical nondestructive examination methods should be employed to determine indication length, depth, and orientation (sizing) of discontinuities in ~~Yankee~~yankee dryers. Magnetic particle, specifically the wet fluorescent method, and dye penetrant methods are applicable in the evaluation of surface-breaking indications. Ultrasonic testing is the standard method for evaluation of surface-breaking and embedded indications. Radiographic methods are useful in the evaluation of embedded indications. Acoustic emission testing can be used to locate and determine if a linear indication is active, i.e., propagating crack. Metallographic analysis is useful in differentiating between original casting discontinuities and cracks.

c) When nondestructive examination produces an indication, the indication is subject to interpretation as false, relevant, or non-relevant. If it has been interpreted as relevant, the necessary subsequent evaluation will result in a decision to accept, repair, replace, monitor, or adjust the maximum allowable operating parameters.

S5.6 PRESSURE TESTING

a) Water pressure testing in the field is not recommended because of the large size of the ~~Yankee~~yankee dryers and the resulting combined weight of the ~~Yankee~~yankee dryer and the water used in testing. This combined weight can lead to support structure overload. Several failures of ~~Yankee~~yankee dryers have occurred during field pressure testing using water. If this test must occur, the following review is recommended:

1) The testing area should be evaluated for maximum allowable loading, assuming the weight of the ~~Yankee~~yankee dryer, the weight of the water filling the ~~Yankee~~yankee dryer, and the weight of the support structure used to hold the ~~Yankee~~yankee dryer during the test.

2) The building and supporting structures should be assessed for overload.

~~2) The manufacturer should be contacted to provide information on building the Yankee dryer support structure for the water pressure test. Typically, the Yankee dryer is supported on saddles that contact the testing area and should be evaluated for maximum allowable loading, assuming the weight of the Yankee dryer, the weight of the water filling the Yankee dryer, and the weight of the support structure used to hold the Yankee dryer during the test.~~

~~PL. 5~~

3) The ~~Yankee~~yankee manufacturer should be contacted to provide information on building the ~~Yankee~~yankee dryer support structure for the water pressure test. Typically, the ~~Yankee~~yankee dryer is supported on saddles that contact the ~~Yankee~~yankee dryer shell at each end near the head-to-shell joint. The manufacturer can provide information on saddle sizing and location so that the ~~Yankee~~yankee dryer is properly supported for the test.

b) Steam or air is recommended when pressure testing is performed. Acoustic emission testing is recommended in conjunction with pressure testing when there are concerns for deterioration or fitness for service.~~When pressure testing is desired to evaluate forms of deterioration, acoustic~~

~~emission testing, with steam or air, is recommended. Typically, the test pressure used is the operating pressure~~.

~~S5.7 TABLES AND FIGURES~~

~~c)~~ ~~FIGURE S5.2, De-Rate Curve.~~

FORM NB-5 BOILER OR PRESSURE VE

FIRST INTERNAL INSPECTIC

Standard Form for Jurisdictions Operating under

1	DATE INSPECTED MO / DAY / YEAR	CERT EXP DATE MO / YEAR	CERTIFICATE POSTED [] YES [] NO	OWNER NUMBER	JU
2	EQUIPMENT LOCATION NAME				NA
	EQUIPMENT LOCATION STREET ADDRESS				EQUIP LO
3	CERTIFICATE BUSINESS NAME				CERT CO
	CERTIFICATE MAILING STREET ADDRESS				CERT CI
4	INVOICE BUSINESS NAME				CERT IN
	INVOICE STREET ADDRESS				INVOICE
5	TYPE [] FT []WT [] CI []AIR TANK []WATER TANK [] OTHER_____			YEAR BUILT	YEAR IN
6	USE [] POWER [] PROCESS [] STEAM HEATING [] HWH [] HWS [] STORAGE [] HEAT EXCHANGE []OTHER _____				FUEL (BO
7	PRESSURE ALLOWED MAWP_____ THIS INSPECTION_____ PREVIOUS INSPECTION_____			# OF PRVS _____ TOTAL CAPACITY SET PRESSURE _____ CAPACITY____ SET PRESSURE _____ CAPACITY____ SET PRESSURE _____ CAPACITY____	
8	ARE THERE ANY OUTSTANDING (OPEN) VIOLATIONS FOR THIS EQUIPMENT? [] YES [] NO (IF YES, EXPLAIN FULLY UNDER ADVERSE CONDITI				

REMAINDER OF FORM IS UN

:SSEL DATA REPORT

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the ASME Code

JRISDICTIONAL NO	NATIONAL BOARDD NO [] SERIAL # (IF CAST IRON) []	CODE OF CONSTRUCTION
TURE OF BUSINESS	KIND OF INSPECTION [] INT [] EXT	CERTIFICATE INSPECTION [] YES [] NO

)C CITY	EQUIP LOC STATE
)NTACT NAME	CERT CONTACT E-MAIL
TY	CERT STATE
VOICE CONTACT NAME	INVOICE E-MAIL
CITY	INVOICE STATE

STALLED	MANUFACTURER	[] NEW [] REINSTALL

)ILER)	METHOD OF FIRING (BOILER)	LOCATION IN PLANT
_____ _____ _____ _____	EXPLAIN IF PRESSURE CHANGED	
)NS FOUND)	HYDRO PRESSURE TEST [] YES _____PSI DATE_____ [] NO	

NCHANGED

FORM NB-6 BOILER-FIRED PRES

REPORT OF INSPECTION

Standard Form for Jurisdictions Operating under

1	DATE INSPECTED MO / DAY / YEAR	CERT EXP DATE MO / YEAR	CERTIFICATE POSTED [] YES [] NO	OWNER NUMBER	JURISDI
2	EQUIPMENT LOCATION NAME				NA
	EQUIPMENT LOCATION STREET ADDRESS				EQUIP L
3	CERTIFICATE BUSINESS NAME				CERT C
	CERTIFICATE MAILING STREET ADDRESS				CERT CI
4	INVOICE BUSINESS NAME				CERT IN
	INVOICE STREET ADDRESS				INVOICE
5	TYPE [] FT []WT [] CI []OTHER_____			YEAR BUILT	MANUFA
6	USE [] POWER [] PROCESS [] STEAM HEATING [] HWH [] HWS [] OTHER _____				FUEL
7	PRESSURE ALLOWED MAWP_____ THIS INSPECTION_____ PREVIOUS INSPECTION_____			# OF PRVS _____ TOTAL CAPACITY SET PRESSURE _____ CAPACITY____ SET PRESSURE _____ CAPACITY____ SET PRESSURE _____ CAPACITY____	
8	ARE THERE ANY OUTSTANDING (OPEN) VIOLATIONS FOR THIS EQUIPMENT? [] YES [] NO (IF YES, EXPLAIN FULLY UNDER ADVERSE CONDITI				
9	INSPECTORS COMMENTS:				
10	ADVERSE CONDITIONS FOUND:				
11	REQUIREMENTS:				
12	NAME AND TITLE OF PERSON TO WHOM REQUIREMENT WERE EXPLAINED				E-MAIL
	I HEREBY CERTIFY THIS IS A TRUE REPORT OF MY INSPECTION INSPECTOR SIGNATURE			NB COMMISSION #	

THIS FORM MAY BE OBTAINED FROM THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS, 1055 CRUPPER AVE, COLUMBUS, O

SURE VESSEL

the ASME Code

CTIONAL NO	NAT'L BD NO [] OR SERIAL # (IF CAST IRON) []	
TURE OF BUSINESS	KIND OF INSPECTION [] INT [] EXT	CERTIFICATE INSPECTION [] YES [] NO
OC CITY	EQUIP LOC STATE	
ONTACT NAME	CERT CONTACT E-MAIL	
TY	CERT STATE	
VOICE CONTACT NAME	INVOICE E-MAIL	
CITY	INVOICE STATE	
ACTURER		
	METHOD OF FIRING	LOCATION IN PLANT
_____ _____ _____ _____	HEATING SURFACE OR BTU (INPUT/OUTPUT)	
ONS FOUND)	PRESSURE TEST [] YES _____PSI DATE_____ [] NO	

PHONE #

EMPLOYED BY	IDENT. NO.

H 43229

FORM NB-7 PRESSURE V

REPORT OF INSPECTION

Standard Form for Jurisdictions Operating under

1	DATE INSPECTED MO / DAY / YEAR	CERT EXP DATE MO / YEAR	CERTIFICATE POSTED [] YES [] NO	OWNER NUMBER	JURISDI
2	EQUIPMENT LOCATION NAME				NA
	EQUIPMENT LOCATION STREET ADDRESS				EQUIP L
3	CERTIFICATE BUSINESS NAME				CERT C
	CERTIFICATE MAILING STREET ADDRESS				CERT CI
4	INVOICE BUSINESS NAME				CERT IN
	INVOICE STREET ADDRESS				INVOICE
5	TYPE [] AIR TANK [] WATER TANK []OTHER_____			YEAR BUILT	MANUFA
6	USE [] STORAGE [] PROCESS [] HEAT EXCHANGE [] OTHER _____				VERTICA
7	PRESSURE ALLOWED MAWP_____ THIS INSPECTION_____ PREVIOUS INSPECTION_____			# OF PRVS _____ TOTAL CAPACITY SET PRESSURE _____ CAPACITY____ SET PRESSURE _____ CAPACITY____ SET PRESSURE _____ CAPACITY____	
8	ARE THERE ANY OUTSTANDING (OPEN) VIOLATIONS FOR THIS EQUIPMENT? [] YES [] NO (IF YES, EXPLAIN FULLY UNDER ADVERSE CONDITI				
9	INSPECTORS COMMENTS:				
10	ADVERSE CONDITIONS FOUND:				
11	REQUIREMENTS:				
12	NAME AND TITLE OF PERSON TO WHOM REQUIREMENT WERE EXPLAINED				E-MAIL
	I HEREBY CERTIFY THIS IS A TRUE REPORT OF MY INSPECTION INSPECTOR SIGNATURE			NB COMMISSION #	

THIS FORM MAY BE OBTAINED FROM THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS, 1055 CRUPPER AVE, COLUMBUS, O

ESSELS

the ASME Code

CTIONAL NO	NAT'L BD NO [] OR SERIAL # []	
TURE OF BUSINESS	KIND OF INSPECTION [] INT [] EXT	CERTIFICATE INSPECTION [] YES [] NO
OC CITY	EQUIP LOC STATE	
ONTACT NAME	CERT CONTACT E-MAIL	
TY	CERT STATE	
VOICE CONTACT NAME	INVOICE E-MAIL	
CITY	INVOICE STATE	
CTURER		
L / HORIZONTAL	LENGTH	DIAMETER
_____ _____ _____ _____	EXPLAIN IF PRESSURE IS CHANGED	
ONS FOUND)	PRESSURE TEST [] YES _____PSI DATE_____ [] NO	

PHONE #

EMPLOYED BY	IDENT. NO.

H 43229

2.3.6.5 INSPECTION OF PRESSURE VESSELS WITH QUICK-ACTUATING CLOSURES

a) This section describes guidelines for inspection of pressure vessels equipped with quick-actuating closures. Due to the many different designs of quick-actuating closures, potential failures of components that are not specifically covered should be considered. The scope of inspection should include areas affected by abuse or lack of maintenance and a check for inoperable or bypassed safety and warning devices and review of the integrity testing program.

b) Temperatures above that for which the quick-actuating closure was designed can have an adverse effect on the safe operation of the device. If parts are found damaged and excessive temperatures are suspected as the cause, the operating temperatures may have exceeded those temperatures recommended by the manufacturer. Rapid fluctuations in temperatures due to rapid start-up and shutdown may lead to cracks or yielding caused by excessive warping and high thermal stress. A careful observation should be made of the condition of the complete installation, including maintenance and operation (review completed operator inspection weekly log), as a guide in forming an opinion of the care the equipment receives. The history of the vessel should be established, including: year built, materials of construction, extent of postweld heat treatment, previous inspection results, NDE results, and repairs or alterations performed. Any leak should be thoroughly investigated and the necessary corrective action initiated.

1) Inspection of parts and appurtenances

a. Seating surfaces of the closure device, including but not limited to the gaskets, O-rings, or any mechanical appurtenance to ensure proper alignment of the closure to the seating surface, should be inspected. This inspection can be made by using powdered chalk or any substance that will indicate that the closure is properly striking the seating surface of the vessel flange. If this method is used, a check should be made to ensure that:

1. Material used shall not contaminate the gasket or material with which it comes into contact; and

2. The substance used shall be completely removed after the examination.

b. The closure mechanism of the device should be inspected for freedom of movement and proper contact with the locking elements. This inspection should indicate that the movable portions of the locking mechanism are striking the locking element in such a manner that full stroke can be obtained. Inspection should be made to ensure that the seating surface of the locking mechanism is free of metal burrs and deep scars, which would indicate misalignment or improper operation. A check should be made for proper alignment of the door hinge mechanisms to ensure that adjustment screws and locking nuts are properly secured. When deficiencies are noted, the following corrective actions should be initiated:

1. If any deterioration of the gasket, O-ring, etc., is found, the gasket, O-ring, etc., should be replaced immediately. Replacements should be in accordance with the vessel manufacturer's specifications;

2. If any cracking or excessive wear is discovered on the closing mechanism, the owner or user should contact the original manufacturer of the device for spare parts or repair information. If this cannot be accomplished, the owner or user should contact an organization competent in quick-actuating closure design and construction prior to implementing any repairs;

3. Defective safety or warning devices should be repaired or replaced prior to further operation of the vessel;

4. Deflections, wear, or warping of the sealing surfaces may cause out-of-roundness and misalignment. The manufacturer of the closure should be contacted for acceptable tolerances for out-of-roundness and deflection; and

5. The operation of the closure device through its normal operating cycle should be observed while under control of the operator. This should indicate if the operator is following posted procedures and if the operating procedures for the vessel are adequate.

c) The Integrity testing program should be developed by a professional familiar with the design and applications of quick-actuating closures that can identify high stress areas of the closure and the appropriate NDE method needed such as the Original Equipment Manufacturer (OEM) or equivalent professional. Personnel performing NDE must be qualified to ASNT SNT-TC-1A (Recommended Practice for Nondestructive Testing Personnel Qualification and Certification) or ANSI/ASNT CP-189 (Standard for Qualification and Certification of Nondestructive Testing Personnel. The NDE test interval should be at a minimum every five years, more often if deemed necessary by the Original Equipment Manufacturer (OEM), equivalent professional, inspector or jurisdiction. The Integrity Testing Program, NDE Procedure and NDE Written Practice shall be reviewed by the inspector.

Add to NBIC Part I, at a minimum, the requirement for the following safety devices:

- Pressure vessels with quick-actuation closers: A Safety interlock device that prevents the opening mechanism from operating unless the vessel is completely depressurized.
- Automatic dump to safe point on door travel safety switch or occupant activation switch.

PROPOSED REVISION OR ADDITION

Item No.

A 21-40

Subject/Title

Define "Remote" in the NBIC Glossary

NBIC Location

Part: Inspection; Section: 9; Paragraph: Section 9

Project Manager and Task Group

Source (Name/Email)

Terrence Hellman / thellman@nationalboard.org

Statement of Need

Remote Inspections need to be better clarified.

Background Information

With the use of indirect inspection equipment from borescopes to tethered drones/vehicles for confined space inspections, there is a need to clarify what is considered a "remote" inspection vs an "indirect" inspection.

Existing Text	Proposed Text
	Remote Visual Examination: an indirect examination technique used with visual aids for conditions where the area to be inspected is inaccessible for direct physical examination.

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

PROPOSED REVISION OR ADDITION

Item No.

A 21-56

Subject/Title

Clarify what action is necessary after determining the acceptance criteria.

NBIC Location

Part: Inspection; Section: 2; Paragraph: Part 2, 2.3.6.4 f) 5) c)

Project Manager and Task Group

Source (Name/Email)

Luis Ponce / lponce@nationalboard.org

Statement of Need

There is no guidance in the Liquid Ammonia 2.3.6.4 f) 5) paragraphs for the acceptance criteria for corroded areas of considerable size as there are for dents and bulges, for example.

Background Information

The Liquid Ammonia acceptance criteria for corrosion does not provide the option available to the owner/user as it is currently provided for in the other 2.3.6.4 f) and Compressed Air Vessel paragraphs.

Existing Text

Proposed Text

Add the options in 2.3.6.2 b) 2) b. in a new 2.3.6.4. f) 5) d) to follow 2.3.6.4 f) 5) c). Included below is 2.3.6.2 b) 2) b. b. If the corrosion exceeds any of the above criteria, the following options are available to the owner/user. 1. The owner/user may conduct a complete UT survey of the vessel to verify remaining vessel wall thickness. 2. The vessel shall be removed from service until the vessel is repaired by an “R” stamp holder. 3. The vessel shall be removed from service until it can be de-rated to a lower MAWP subject to review and approval by the Jurisdiction. 4. A fitness-for service analysis is performed by a qualified organization. 5. The vessel is permanently removed from service.

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date