



**THE NATIONAL BOARD
OF BOILER AND PRESSURE VESSEL INSPECTORS**

NATIONAL BOARD INSPECTION CODE SUBGROUP REPAIRS & ALTERATIONS

MINUTES

**Meeting of July 16th, 2024
Louisville, KY**

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

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Vessel Inspectors 1055 Crupper Avenue
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1. Call to Order

Chair Underwood called the meeting to order at 8:00 a.m. Eastern Time in the Gallery Ballroom at the hotel.

2. Roll call of Members and Introduction of Visitors

Members and visitors were introduced, and attendance taken.

3. Check for a Quorum

A quorum was established based on Attendance taken ([Attachment 1](#))

4. Announcements

- This meeting marks the end of Cycle D for the 2025 NBIC edition. This meeting marks the end of the 2025 NBIC development cycle and is the last opportunity for code revisions to be approved for the 2025 NBIC.
- The National Board will be hosting a reception on Wednesday evening from 5:30 p.m. to 7:30 p.m. at the Rooftop Garden on the 16th floor of the hotel.
- The National Board will be hosting breakfast and lunch on Thursday in Citation A/B for those attending the Main Committee meeting. Breakfast will be served from 7:00 a.m. to 8:00 a.m. and lunch will be served from 11:30 a.m. to 12:30 p.m.
- Meeting schedules, meeting room layouts, and other helpful information can be found on the National Board website under the **NBIC** tab → NBIC Meeting Information.
- Remember to add any attachments that you'd like to show during the meeting (proposals, reference documents, power points, etc.) to the NBIC file share site (nbfileshare.org) **prior to the meeting.**
 - Note that access to the NBIC file share site is limited to committee members only.
 - ALL power point attachments/presentations must be sent to the NBIC Secretary prior to the meeting for approval.
 - Contact Jonathan Ellis (nbicsecretary@nbbi.org) for any questions regarding NBIC file share access.
- When possible, please submit proposals in Word format showing “strike through/underline”. Project Managers: please ensure any proposals containing text from the 2021 NBIC are updated to contain text from the 2023 NBIC.
- If you'd like to request a new Interpretation or Action item, this should be done on the National Board Business Center.
 - Anyone, member or not, can request a new item.
- As a reminder, anyone who would like to become a member of a group or committee:
 - Should attend at least two meetings prior to being put on the agenda for membership consideration. The nominee will be on the agenda for voting during their third meeting.
 - The nominee must submit the formal request along with their resume to the NBIC Secretary **PRIOR TO** the meeting. nbicsecretary@nbbi.org
 - If needed, we can also create a ballot for voting on a new member between meetings.
- Thank you to everyone who registered online for this meeting. The online registration is very helpful for planning our reception, meals, room set up, etc. Please continue to use the online registration for each meeting. It is also a good way to make sure we have the most up-to-date contact information.

5. Awards and Special Recognitions: None

6. Adoption of the Agenda

The agenda was revised to add membership nominations and editorial corrections to items listed:

- i. Added Part 2/3 Item A24-28
- ii. Revised A24-43
- iii. Added Robert McGuire (Manufacturer) for consideration for SG membership

The agenda was UA as revised.

7. Approval of the Minutes of the January 9, 2024, Meeting

The minutes for the Jan. 9, 2024 meeting were UA.

8. Review of Rosters

a. Membership Nominations

- i. Mr. Tim LeBeau (NB Certificate Holders) is interested in becoming a member of the Subgroup. **He was UA by the SG Membership.**
- ii. Mr. Robert McGuire (Manufacturers) is interested in becoming a member of the Subgroup. **He was UA by the SG Membership.**

b. Membership Reappointments

- i. The following Subgroup R&A memberships are set to expire prior to the January 2025 NBIC meetings: Mr. Steven Frazier, Mr. Michael Quisenberry, Mr. Jim Sekely, and Mr. John Siefert. – **All members were UA to be reappointed.**

c. Officer Nominations: None

d. Resignations: None

9. Action Items

Item Number: A21-12	NBIC Location: Part 3, 3.3.3, 3.4.4, Section 9	Attachment 2
General Description: Clarify the definitions and examples of “Repair” and “Alteration”		
Subgroup: Repairs and Alterations		
Task Group: P. Becker (PM), K. Moore, R. Underwood, , T. Seime, P. Shanks		
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.		
Jan. 2024 Meeting Action: P. Becker presented a PR and asked for any feedback from the group or visitors, as this will be submitted for a LB to SG R&A soon.		
July 2024 Meeting Action: P. Becker presented a revised proposal which passed SG R&A UA.		

Item Number: A21-43	NBIC Location: Part 3, Glossary	Attachment 3
General Description: Defining and revising "Practicable" and "Practical" within the NBIC		
Subgroup: Repairs and Alterations		
Task Group: M. Toth (PM), B. Underwood, L. Dutra, R. Collins, P. Davis, T. White, L. Moedinger, A. Triplett		
Explanation of Need: Defining and revising Practicable and Practical within the NBIC and revising where applicable		
Jan. 2024 Meeting Action: M. Toth presented a PR. Taskgroup updated to add: L. Dutra, R. Collins, P. Davis, T. White, L. Moedinger, A. Triplett		
July 2024 Meeting Action: M. Toth presented a proposal that Passed w/4 neg votes (R. Spuhl, A. Triplett, J. Siefert, B. Schaefer)		

Item Number: A21-44	NBIC Location: Part 3, Glossary, 3.4.1	No Attachment
General Description: Defining "De-Rating" within Part 3		
Subgroup: Repairs and Alterations		
Task Group: M. Toth (PM), B. Underwood, M. Wadkinson, L. Dutra, J. Ferreira, M. Schaser, D. Kinney		
Explanation of Need: Defining de-rating within Part 3		
Jan. 2024 Meeting Action: M. Toth presented a PR. Taskgroup updated to remove B. Wielgoszinski and add; M. Wadkinson, L. Dutra, J. Ferreira, M. Schaser, D. Kinney		
July 2024 Meeting Action: M. Toth proposed to Close w/No Action . The motion was UA.		

Item Number: A21-45	NBIC Location: Part 3, Supplements	No Attachment
<p>General Description: Engineered Repairs and Alterations Supplement</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: M. Schaser (PM), B. Boseo, B. Ray, D. Marek, R. Underwood, J. Siefert, P. Becker</p> <p>Explanation of Need: In an effort to simplify the main body of NBIC Part 3, we are proposing a new Supplement called Engineered Repairs and Alterations which will import some existing, more complex activities from the main body and then eventually add new repair and alteration activities that are not currently addressed in the Part 3.</p> <p>Jan. 2024 Meeting Action: R. Underwood presented a PR; this proposal is ready for SC.</p> <p>July 2024 Meeting Action: R. Underwood presented a PR; this proposal is ready for SC.</p>		

Item Number: A21-53	NBIC Location: Part 3, S8.5 a)	No Attachment
<p>General Description: Post Repair Inspection of weld repairs to CSEF steels</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: P. Gilston (PM), E. Cutlip, A. Triplett</p> <p>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.</p> <p>Jan. 2024 Meeting Action: P. Gilston presented a PR.</p> <p>July 2024 Meeting Action: P. Gilston presented a PR.</p>		

Item Number: A22-18	NBIC Location: Part 3, Glossary	No Attachment
<p>General Description: Definition of blowdown and blowoff</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: K. Moore (PM). M. Quisenberry, G. Scribner, M. Wadkinson</p> <p>Explanation of Need: These terms are not consistently used throughout the industry. This is to provide guidance to use the correct term when addressing the equipment or the action.</p> <p>Jan. 2024 Meeting Action: K. Moore presented a PR.</p> <p>July 2024 Meeting Action: K. Moore presented a PR.</p>		

Item Number: A23-09	NBIC Location: Part 3, New Supplement	Attachment 4
<p>General Description: Scope and Rules for use of Additive Manufacturing Pressure Parts</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: G. Galanes (PM), J. Siefert, B. Schaefer, W. Sperko, J. Ferreira, J. Getter, T. Seime, M. Wadkinson</p> <p>Explanation of Need: Developing rules for the use of additive manufacturing pressure parts in alterations.</p> <p>Jan. 2024 Meeting Action: Galanes presented a proposal that will be going to SG R&A as a RVW and Comment LB.</p> <p>July 2024 Meeting Action: Galanes presented revisions to the proposal based on the Rvw & Comment LB, this will go to SG R&A for LB Vote</p>		

Item Number: A23-13	NBIC Location: Part 3, 3.3.3 s)	No Attachment
<p>General Description: Consistent addressing of the term for weld metal</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: P. Gilston (PM), W. Sperko, J. Siefert, T. Melfi, F. Johnson</p> <p>Explanation of Need: Item for addressing consistent addressing of the term for weld metal is being opened based on discussions on A21-82. Weld Metal vs Filler Metal vs Filler Material, etc.</p> <p>Jan. 2024 Meeting Action: P. Gilston presented. The proposal had been revised based on Part 4 comments. The proposal was UA.</p> <p>July 2024 Meeting Action: P. Gilston presented a PR.</p>		

Item Number: A23-21	NBIC Location: Part 3, 3.3.4.9	Attachment 5
<p>General Description: Boiler tube plug guidelines and inclusion or watertube boilers (Supersedes previously approved item A21-67)</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: E. Cutlip (PM), P. Gilston, K. Moore, A. Triplett</p> <p>Explanation of Need: Currently both firetube and watertube boilers require a boiler tube be plugged when replacement of a tube is not practicable at the time the defective tube is detected.</p> <p>Jan. 2024 Meeting Action: E. Cutlip presented a PR</p> <p>July 2024 Meeting Action: P. Gilston presented a proposal for a vote. The item passed with 4 negatives and 3 abstentions. (Neg. votes = M. Quisenberry, T. McBee, L. Dutra, C. Hopkins; Abstentions = B. Schaefer, J. Ferreira, T. Seime)</p>		

Item Number: A23-24	NBIC Location: Part 3	Attachment 6
General Description: Repairs to quick actuating closures		
Subgroup: Repairs and Alterations		
Task Group: T. McBee (PM), C. Becker, M. Schaser, A. Khssassi, R. Smith		
Explanation of Need: Put safe guidelines for repairs to quick actuating closures.		
July. 2024 Meeting Action: T. McBee presented a proposal which was UA.		

Item Number: A23-35	NBIC Location: All Parts, 9.1	No Attachment
General Description: Definition of "non-load bearing attachment" (All Parts)		
Subgroup: Repairs and Alterations		
Task Group: T. White (PM), A. Khssassi, J. Walker, P. Lentzer		
Explanation of Need: The term "nonload bearing attachment" is used as a basis for determining a routine repair but is not defined in the NBIC.		
Jan. 2024 Meeting Action: T. White presented. Based on conversation, this term may be defined in other codes already, and may need to be revised.		
July 2024 Meeting Action: T. White presented a PR.		

Item Number: A23-36	NBIC Location: Part 3, 4.2 a) and 4.4 b)	No Attachment
General Description: Clarifying Rules for Using Alternative NDE Methods		
Subgroup: Repairs and Alterations		
Task Group: Tom White (PM), P. Miller, S. Frazier, J. Walker, R. Collins, P. Becker, P. Lentzer, A. Triplett		
Explanation of Need: It has been determined that there may be some confusion regarding allowable NDE methods for repairs and alterations. The existing language of 4.2 a) tells the reader that alternative NDE methods acceptable to the Inspector and, where required, the Jurisdiction, may be used provided the requirements of Section 4 are met. However, it is possible that the reader is not familiarizing themselves with all of the requirements of Section 4 prior to proposing an alternative NDE method. This change should help clarify and reinforce the requirements for alternative NDE methods for repairs and alterations.		
Jan. 2024 Meeting Action: T. White presented a proposal based on MC feedback. The proposal was revised and UA by the SG R&A.		
Update: A23-36 and A23-59 have been rolled into A23-77 and will be Closed w/No Action		
July 2024 Meeting Action: A motion to Close w/No Action was UA.		

Item Number: A23-39	NBIC Location: Part 3, 3.3.1	Attachment 7
General Description: Strengthening Prevention of Defect Recurrence		
Subgroup: Repairs and Alterations		
Task Group: J. Ferreira (PM), J. Walker, F. Johnson, P. Gilston, A. Henson, G. Galanes, B. Hrubala		
Explanation of Need: The existing text recommends, but does not require an investigation of the cause, extent, and likelihood of recurrence of defects. The existing text also has no requirement for anyone to act to prevent the recurrence of defects. Where root and/or proximate causes of defects are known, or could be determined, someone needs to act to prevent catastrophic failure of equipment.		
Jan. 2024 Meeting Action: J. Ferreira presented a proposal that was revised during discussion. The revised proposal was Approved with 1 Disapproval (K. Moore), and 2 Abstentions (M. Toth, R. Spuhl).		
July 2024 Meeting Action: J. Ferreira presented a proposal which was UA.		

Item Number: A23-40	NBIC Location: Part 3, 3.3.4.1	No Attachment
General Description: Strengthening Requirements to Ensure Defect Removal		
Subgroup: Repairs and Alterations		
Task Group: L. Dutra (PM), E. Cutlip, A. Renaldo, R. Valdez, T. McBee, A. Henson		
Explanation of Need: The existing text alludes to the potential need for nondestructive examination (NDE) to ensure complete removal of defects but does not require it. The means to ensure defects have been removed must be understood by all to ensure safety. There is an interpretation of the 2021 NBIC that compounds this issue permitting repair organizations to not follow the requirements of NBIC Part 3, 3.3.4.8 even when the characteristics of the defect cannot be fully established.		
Jan. 2024 Meeting Action: L. Dutra presented a PR.		
July 2024 Meeting Action: L. Dutra presented a PR.		

Item Number: A23-41	NBIC Location: Part 3, 3.3.4.6 a) 2)	Attachment 8
General Description: Strengthening Requirements for Defect Removal When Patching (tied to I24-51)		
Subgroup: Repairs and Alterations		
Task Group: A. Khssassi (PM), L. Dutra, A. Renaldo		
Explanation of Need: The existing text requires the removal of defective material until sound material is reached but provides no requirements or guidance on means to employ to ensure complete removal of defective material. The means to ensure defects have been removed must be understood by all to ensure safety. There is an interpretation of the 2021 NBIC that compounds this issue permitting repair organizations to not follow the requirements of NBIC Part 3, 3.3.4.8 even when the characteristics of the defect cannot be fully established.		
Jan. 2024 Meeting Action: A. Khssassi presented a PR		
July 2024 Meeting Action: A. Khssassi presented a proposal which was UA. The Intent Interp (I24-51) was also discussed and was approved by the SG to be discussed tomorrow at SC.		

Item Number: A23-59	NBIC Location: Part 3, 4.2 a) and b)	No Attachment
General Description: NDE Personnel Certifications for Repairs and Alterations		
Subgroup: Repairs and Alterations		
Task Group: A. Triplett (PM), P. Lentzer		
Explanation of Need: The 2023 Edition revision to 4.2.a, which revises language about codes to be used for NDE on repairs/alterations (i.e., to codes other than the original construction code), is not reflected in 4.2.b. This creates conflicting requirements between 4.2.a and 4.2.b; in a case where use of the construction code is practicable, but NDE personnel certification to another Code/standard is desirable, 4.2.a would allow this but 4.2.b would not.		
January 2024 Meeting Action: A. Triplett presented a proposal, which was revised multiple times. This was a PR to allow NDE personnel requirements to be moved from 4.2 a) to 4.2 b).		
Update: A23-36 and A23-59 have been rolled into A23-77 and will be Closed w/No Action		
July 2024 Meeting Action: A proposal to Close w/No Action was UA.		

Item Number: A23-61	NBIC Location: Part 3, S9.3	No Attachment
General Description: Revise NBIC R-2 Report and guide		
Subgroup: Repairs and Alterations		
Task Group: B. Schaefer (PM), T. LeBeau		
Explanation of Need: Updates to the R-2 Report and the guide for completing R Report.		
January 2024 Meeting Action: B. Schaefer presented a PR.		
July 2024 Meeting Action: B. Schaefer presented a PR		

Item Number: A23-68	NBIC Location: Part 3, 3.4.4 c) and d)	No Attachment
General Description: Changes to Examples of Alterations		
Subgroup: Repairs and Alterations		
Task Group: M. Schaser (PM), T. McBee, P. Becker, L. Baker		
Explanation of Need: The current wording of 3.4.4.d (2023) is open ended and may result in allowing significant design changes to a pressure vessel under the guise of a repair when an alteration is a more appropriate classification. Rewording is required to limit the scope of potential design changes.		
January 2024 Meeting Action: M. Schaser presented and the proposal, which was revised and taken back as a PR. P. Becker and L. Baker were added to the TG.		
July 2024 Meeting Action: M. Schaser presented a PR		

Item Number: A23-69	NBIC Location: Part 3, 9.1	No Attachment
<p>General Description: Update definitions of Field, Shop, and add definition for Temporary Locations</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: R. Miletti (PM), E. Cutlip, M. Toth, J. Walker</p> <p>Explanation of Need: This is a definition change to align with the latest NB-415 revision adding definitions for "Shop", "Field Site", and "Temporary Location".</p> <p>Update - Failed SG LB (12-3-9) in Dec. 2023</p> <p>January 2024 Meeting Action: R. Miletti presented that the previous proposal making reference to NB-415 was rejected by the SG. A revised proposal from P. Gilston was submitted with definitions SIMILAR to what is in NB-415 to be incorporated into the NBIC Definitions. The proposal was UA.</p> <p>Update: SC R&A - UA, and will need to be LB to Parts 1, 2 and 4 SC. (7/12/24)</p> <p>July 2024 Meeting Action: Ready for MC</p>		

Item Number: A23-77	NBIC Location: Part 3, 4.2 a)	Attachment 9
<p>General Description: Performance of Original NDE During Repairs and Alterations</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: A. Triplett (PM), S. Frazier, J. Walker, R. Collins, P. Becker, P. Lentzer</p> <p>Explanation of Need: The existing language in Part 3, Section 4, Paragraph 4.2.a does not provide enough guidance or flexibility for Repair Organizations and owners to prescribe appropriate NDE for repairs/alterations to existing welds. Based on the limited, often non-specific documentation typically available to these entities during NBIC repairs and alterations, additional allowances and direction should be provided.</p> <p>January 2024 Meeting Action: A. Triplett will wait until A23-04 is considered at SC and MC and may combine with A23-36, as it deals with 4.2 a). This was a PR.</p> <p>Update: A23-36 and A23-59 have been rolled into A23-77 and will be Closed w/No Action</p> <p>July 2024 Meeting Action: A. Triplett presented a Rvw & Comment LB to SG R&A</p>		

Item Number: A23-78	NBIC Location: Part 3, S8	Attachment 10
General Description: Rev. NB-23 Part 3, Supplement 8 & Fig. S8.3-b		
Subgroup: Repairs and Alterations		
Task Group: P. Becker (PM)		
Explanation of Need: Add 'Step 5' to FIGURE S8.3-b. (currently missing). Remove references to 'B9' and 'B87' weld filler metal including Notes A, B, and C in Table S8.2.1		
January 2024 Meeting Action: P. Becker presented. Several comments on revisions were made that updates to B9 references were complete in Section II Part C and Section IX to support the revisions to S8 and P. Becker intends to submit to LB once revisions are made. This was a PR.		
July 2024 Meeting Action: P. Becker presented a proposal which was UA .		

Item Number: A23-83	NBIC Location: Part 3, New Engineered repairs and Alteration Supplement	Attachment 11
General Description: Relocating Existing Repairs to new Eng. Repair & Alteration Supplement		
Subgroup: Repairs and Alterations		
Task Group: M. Schaser (PM), R. Underwood		
Explanation of Need: In an effort to simplify the main body of Part 3, we are proposing to relocate some of the more complex repair methods to the new Engineered Repair & Alterations supplement. This item proposes to relocate three existing repair methods.		
Update - SG LB approved.		
January 2024 Meeting Action: R. Underwood presented a PR as this item will be presented to SC R&A.		
July 2024 Meeting Action: M. Schaser presented a proposal that was UA .		

Item Number: A23-86	NBIC Location: Part 3, S6.5 & S6.6	No Attachment
<p>General Description: Revision to Part 3 DOT Supplement re-write</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: R. Underwood (PM)</p> <p>Explanation of Need: There is a need to revise two sections of Item 20-67 (approved by Main Committee on 3/24/2023) to reflect DOT requirements and bring the sections in line with intent interpretation I23-55.</p> <p>January 2024 Meeting Action: R. Underwood presented a PR as this item will be go to SG R&A LB.</p> <p>July 2024 Meeting Action: R. Underwood presented a PR, as this has passed SG LB and is ready for SC.</p>		

Item Number: A24-01	NBIC Location: Part 3, 3.3.3 j)	No Attachment
<p>General Description: Change to Examples of Repairs</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: M. Schaser (PM), R. Collins, C. Hopkins, K. Derrick, S. Lombardo</p> <p>Explanation of Need: Revision to 3.3.3(j) is needed to establish a code-based nozzle-to-nozzle spacing requirement to cover nozzle installation for both ASME VIII-1 and ASME VIII-2 design requirements.</p> <p>January 2024 Meeting Action: M. Schaser presented and motioned for a vote. The vote failed the SG and the following people were added to the taskgroup: R. Collins, C. Hopkins, K. Derrick, S. Lombardo.</p> <p>July 2024 Meeting Action: M. Schaser presented a PR.</p>		

New Action Items:

Item Number: A24-12 NBIC Location: Part 3, S7.5 Attachment 12
<p>General Description: Reference to change of service for LPG vessels incorrectly uses "altered"</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: M. Vogt (PM), S. Frazier, B. Hrubala</p> <p>Explanation of Need: Conversion of service for LPG tanks (typically from above ground to underground service) typically involves changes to the vessel covered under Part 3, Paragraph 3.3.3 and, as such, are considered repairs. As such, the language referring to these conversions that uses the word "altered" may be confusing to an inspector or other user of NBIC. I suggest changing the word "altered" to "changed".</p> <p>This action item was previously submitted requesting changes to both Part 2 and Part 3 under Item 23-30. The changes to Part 2 were reviewed and approved by SG Inspection, SC Inspection, and Main Committee in July 2023. However, a separate action item to address the changed needed in Part 3 was never opened. Therefore, I'm submitting this now as a new action item for Part 3. A similar language change has already been approved for Part 2. This change request is to synchronize the language in both parts.</p> <p>July 2024 Meeting Action: M. Vogt presented a proposal which was UA.</p>

Item Number: A24-13 NBIC Location: Part 3, 1.5.1 No Attachment
<p>General Description: Correction of wording errors in NBIC Part 3, 1.5.1</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: T. Seime (PM), M. Vogt, J. Siefert</p> <p>Explanation of Need: To provide clear guidance to Certificate Holders and Review Team Leaders of requirements to be included in the Quality System.</p> <p>Update: SG & SC Approved via LB.</p> <p>July 2024 Meeting Action: Ready to MC</p>

Item Number: A24-15	NBIC Location: Part 3, 4.2	Attachment 13
<p>General Description: NDE requirements</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: M. Quisenberry (PM), M. Wadkinson, S. Frazier, R. Spuhl</p> <p>Explanation of Need: B31.1 has introduced very stringent requirements on the R-Certificate holders that will create an unnecessary burden on them.</p> <p>July 2024 Meeting Action: M. Quisenberry presented a proposal that was UA.</p>		

Item Number: A24-17	NBIC Location: Part 3, 5.7.5 b)	No Attachment
<p>General Description: Specific Requirements For Stamping And Nameplates</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: E. Cutlip (PM), B. Schaefer, A. Khssassi</p> <p>Explanation of Need: 2023 ASME Section VIII-Div 1 UG-119(c)(5) has been revised to allow for the use of mechanical etching or laser annealing on nameplates.</p> <p>July 2024 Meeting Action: B. Schaefer presented a PR.</p>		

Item Number: A24-18	NBIC Location: Part 3, 9.1	Attachment 14
<p>General Description: Definition of Controlled Fill</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: P. Gilston (PM), A. Triplett, R. Collins, F. Johnson</p> <p>Explanation of Need: Interpretation item I 23-79 addresses the use of the term ‘controlled fill’ in relation to welding method 6. The term is used in 2.5.3 d in relation to welding method 6 and more specifically in Supplement 8. Supplement 8 gives a lot of detail in schematics about a controlled fill in terms of weld bead placement, its use in controlling heat input etc., but in Welding Method 6 the term is not specifically used, but direction for welding is given, typically preheats are specified, electrode size for SMAW, and the use of stringer beads only.</p> <p>Update: LB to All Parts at SG level – Only passed Part 1</p> <p>July 2024 Meeting Action: P. Gilston presented a proposal which was UA by SG. This will need to be LB to Part 1, 2, and 4 SG.</p>		

Item Number: A24-20	NBIC Location: Part 3, 9.1	No Attachment
<p>General Description: Define "Engineered Repairs" and "Engineered Alterations"</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: M. Schaser (PM), B. Ray, R. Underwood, B. Boseo, D. Marek, J. Siefert, P. Becker</p> <p>Explanation of Need: The new supplement dealing with "Engineered Repairs and Alterations" (A21-45) will impact Part 3 Section 1, the NB-415, QRRs, the application process for Certificate Holders, and other documents to be determined. Defining "Engineered Repairs" and "Engineered Alterations" clarify the intent for these new scopes.</p> <p>July 2024 Meeting Action: M. Schaser presented a PR.</p>		

Item Number: A24-21	NBIC Location: Part 3, 9.1	No Attachment
<p>General Description: Engineered Repairs and Alterations - Section 1 Scope and Manual reqs</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: M. Schaser (PM), B. Ray, R. Underwood, B. Boseo, D. Marek, J. Siefert, P. Becker</p> <p>Explanation of Need: The scope of "Engineered Repairs and Alterations" (A21-45) needs to be clarified in 1.4.1 d) and reflected in the scope statement requirements for manuals in 1.5.1 a).</p> <p>July 2024 Meeting Action: M. Schaser presented a PR.</p>		

Item Number: A24-28	NBIC Location: Part 2, S9.9 b) 4)	No Attachment
<p>General Description: Applying PWHT to previously "as welded" item</p> <p>Subgroup: Inspection Task Group: None assigned. Submitted by: J. Swezy</p> <p>Explanation of Need: The NBIC clearly lists the application of PWHT to a PRI that was not previously PWHT by the original Manufacturer as an example of an alteration. I agree with that statement and believe it is appropriate to consider this to be an alteration. I do not under why the NBIC considers this as an acceptable alteration but does not provide its users with any guidance as to how they should address its implementation. It seems very clear to me that applying PWHT to such welds is rarely detrimental when properly applied and should not reduce their strength or toughness. If anything it should prove helpful rather than harmful under properly considered application. Good engineering practice mandates that a carbon steel vessel undergoing a change to wet H2S service should receive PWHT to provide an improved resistance to hydrogen cracking corrosion. Failing to do so would be irresponsible. The NBIC rules for a change of service even mention this as a factor to consider in Part 2, Table S-9.4.</p> <p>July 2024 Meeting Action: J. Swezy selected as PM. This was a PR.</p>		

Item Number: A24-22	NBIC Location: Part 3, 2.5.3	Attachment 15
<p>General Description: Alternative Welding Methods without PWHT- Competent Technical Advice</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: E. Cutlip (PM), J. Ferreira</p> <p>Explanation of Need: The first sentence of 2.5.3 (b) requires the competent technical advice to be obtained for the use of every alternative welding method which can be impractical. In most cases, the R certificate firm that is making the determination to use alternative welding method. Most R-certificate holders do not retain a record of the component technical advice they may get.</p> <p>Competent technical advice is used in paragraph 3.2.1 and 3.3.4.3 (d)(1) and the wording states competent technical advice should be obtained. But in 2.5.3 (b) states competent technical advice shall be obtained.</p> <p>July 2024 Meeting Action: J. Ferreira presented a proposal which was UA.</p>		

Item Number: A24-43	NBIC Location: Part 3, 1.3.2	Attachment 16
<p>General Description: Certification of Reports of Repair without stamping - Action Item with I24-39</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: M. Vogt (PM), R. Spuhl</p> <p>Explanation of Need: Given INTERP 21-16 requirements, clarity is needed for R/NR work where the lack of stamping due to a practical matter, not necessarily a jurisdictional reason, may preclude certifying a Report of Repair. This Action Item is tied to Intent Interpretation I24-39.</p> <p>July 2024 Meeting Action: R. Spuhl presented a presentation that was UA.</p>		

Item Number: A24-60	NBIC Location: Part 3, 3.3.5.2 a) and 3.4.5.1	No Attachment
<p>General Description: Revise the repair and alteration Sect VIII Div 2 and 3 paragraphs</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: R. Collins (PM)</p> <p>Explanation of Need: A revision of Part 3, 3.3.5.2 a) and 3.4.5.1 a), b), and c) are needed to reconcile the NBIC to Divisions 2 and 3 of ASME Section VIII. The attached proposal includes the complete revision draft.</p> <p>July 2024 Meeting Action: R. Collins presented a PR.</p>		

Item Number: A24-61	NBIC Location: Part 3, 2.5.3 e) and 4.2	No Attachment
<p>General Description: Relocate Volumetric NDE requirement for Weld Repair Greater than 3/8-inch</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: M. Schaser (PM), M. Quisenberry, K. Derrick, B. Schaefer</p> <p>Explanation of Need: Relocate the volumetric NDE requirement for weld repairs of 3/8-inch depth or greater from paragraph 2.5.3.e to paragraph 4.2.</p> <p>July 2024 Meeting Action: M. Schaser presented a PR. M. Quisenberry, K. Derrick, and B. Schaefer were added to the TG.</p>		

Item Number: A24-65 **NBIC Location: Part 3, Table 1.5.1 d)**

[Attachment 17](#)

General Description: Applicability of Table 1.5.1 d)

Subgroup: Repairs and Alterations

Task Group: T. White (PM)

Explanation of Need: The term "administrative" appears 16 times in Part 3 but nowhere does the NBIC require or describe an administrative review of the "R" Certificate Holder's administrative processes. In addition, under the "Instructions" column, Supplement 6 should be Section 6 to include all the supplements if item d) is to be kept.

July 2024 Meeting Action: T. White presented a proposal that was UA.

10. Future Meetings

- January 13-16, 2025 – Charleston, SC
- July 2025 – TBD

11. Adjournment @ 5:07 PM by Chair Underwood.

Respectfully submitted,

Terrence Hellman

Terrence Hellman

SG R&A Secretary

SG R&A

Member	Full Name	Email Address	Company Name	Title	Reg. Type	Present
M	Collins, Riley	rileycollins@eastman.com	Eastman Chemical Company	Mechanical Engineer	In-person	X
M	Dutra, Louis	dutra@baycityboiler.com	Bay City Boiler	QA/ QC Manager	In-person	X
M	Ferreira, Jon	jonathan_ferreira@hsb.com	The Hartford Steam Boiler Inspection and Insurance Company	Technical Manager	In-person	X
M	Khssassi, Aziz	aziz.khssassi@rbq.gouv.qc.ca	Régie du Bâtiment du Québec	AIA Program Coordinator	In-person	X
M	McBee, Tim	Timothy.McBee@tuvsud.com	ARISE	Manager of Codes and Standards	In-person	X
M	Quisenberry, Michael	michael@spartan-mech.com	Spartan Boiler	President	In-person	X
M	Schaefer, Ben	bschaefer@aep.com	AEP	Quality Control Manager	In-person	X
M	Schaser, Matt	mschaser@e2g.com	The Equity Engineering Group, Inc.	Senior Engineer, P.E.	In-person	X
M	Seime, Trevor	tsseime@nd.gov	State of ND	Chief Boiler Inspector	In-person	X
M	Siefert, John	jsiefert@epri.com	Electric Power Research Institute	Program Manager	In-person	X
M	Sperko, Walter	wsperko@bellsouth.net	Sperko Engineering	President	In-person	X
M	Spuhl, Raymond	raymond_spuhl@hsb.com	The Hartford Steam Boiler Inspection and Insurance Company	Manager Code Services	In-person	X
M	Toth, Marty	mtoth@boiscotraininggroup.com	ECS Consulting & the Boisco Training Group	Principal	In-person	X
M	Triplett, Andrew	triplett@ornl.gov	UT-Battelle, LLC	Boiler and Pressure Vessel Program Lead	In-person	X
M	Vogt, Mark	mark.vogt@vistracorp.com	Luminant	Consulting Engineer - Boiler SME	In-person	X
M	White, Thomas	thomas.white@nrg.com	NRG Energy	Specialist IV	In-person	X
M	Frazier, Steve	steve.frazier@seattle.gov	City of Seattle	Chief Boiler Inspector	Remote	
M	Johnson, Frank	fjkeck22@aol.com	Johnson Welding	Owner	In-person	X
M	Sekely, Jim	jsekely@comcast.net	Welding Services, Inc.	President	Remote	X
M	Cutlip, Eric	evcutlip@babcock.com				
M	Hopkins, Craig	chopkins@seattleboiler.com			Remote	x
M	Valdez, Rick	rvaldez@prim.com				
M - Chair	Underwood, Bob	robert_underwood@hsb.com	HSB	Quality Engineer	In-person	X
M - VC	Davis, Paul	paul.davis22@woodplc.com	Wood Group	Consultant QA/QC	In-person	X
	Amato, Joel	jamato@nationalboard.org	NBBI	Executive Director	In-person	
	Anderson, Chris	canderson@lmce.solutions	Liquid Metal	COO	In-person	X
	Baker, Lane	lbaker@us.tuv.com	TUV Rheinland	Manager Codes & Standards International	In-person	X
	Bates, Johnathon	bates@ibb026.org	Boilermakers	Business Agent	In-person	X
	Becker, Charles	hggbecker@yahoo.com	Bureau Veritas	Director of Technical Services	In-person	
	Becker, Pat	pbecker3135@gmail.com	EPRI	Technical Leader	In-person	X
	Boseo, Brian	bmboseo@burnsmcd.com	Burns & McDonnell	Department Manager	In-person	X
	Burpee, John	john.h.burpee@maine.gov	State of Maine	Chief Boiler Inspector	In-person	
	Carlson, Mike	camx235@lni.wa.gov	State of Washington	State of Maine Chief Boiler/Pressure Vessel Inspector	In-person	X
	Chatham, Everett	echatham@becht.com	Becht	Pressure Vessel Group Lead	In-person	X
	Derrick, Kiwi	kiwi.derrick@chevron.com	Chevron	Sr. Reliability Inspector	In-person	X
	Galanes, George	ggalanes@diamondtechnicalservices.com	DTS Inc.	Consulting Engineer	In-person	X
	Gilston, Philip	philip_gilston@hsb.com	Hartford Steam Boiler	Principal Engineer - Codes & Standards	In-person	X
	Goossens, Greg	ggoossens@nationalboard.org	NBBI	Director of Jurisdictional Affairs	In-person	
	Haney, JR	clifford.haney@tuvsud.com	Arise	District Manager	In-person	X
	Henson, Adam	adam.henson@csb.gov	U.S. Chemical Safety Board	Recommendations Specialist	In-person	X
	Hrubala, Bernie	bhrubala@us.tuv.com	TUV Rheinland AIA Services	Consultant	In-person	X
	LeBeau, Tim	tlebeau@southernco.com	Southern Company Services		In-person	X
	Marks, Stacey	stacey.marks@bureauveritas.com	Bureau Veritas Inspection & Insurance	Director	In-person	X
	Melfi, Teresa	teresa_melfi@lincolnelectric.com	Lincoln Electric	Technical Fellow	In-person	x
	Miletti, Ray	rlmiletti@babcock.com	Babcock & Wilcox	Director, Global Quality	Remote	X



PROPOSED REVISION OR ADDITION

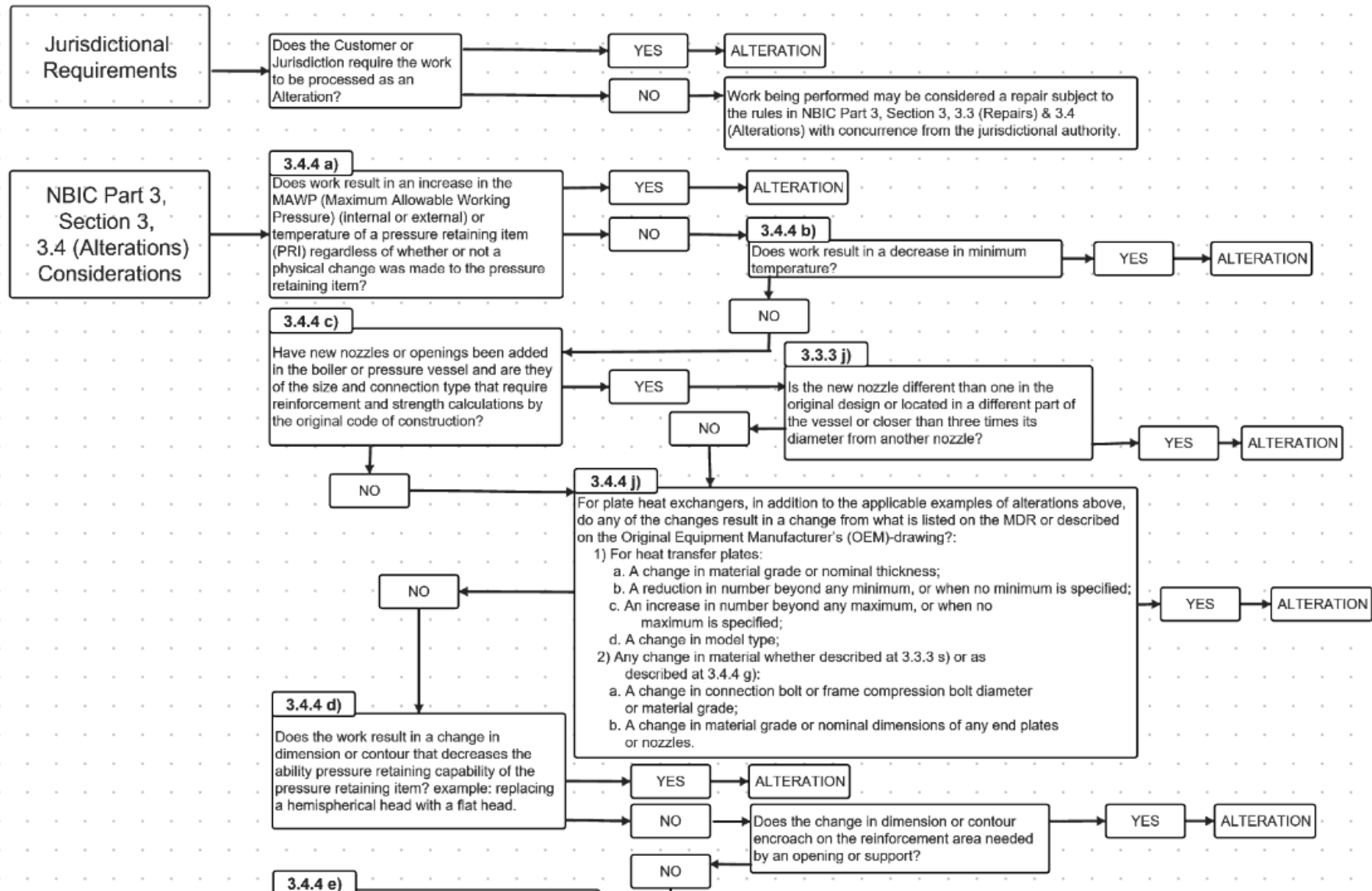
Item No. A 21-12	
Subject/Title Revision to add an introductory paragraph to Part 3, Section 3 and to add guidance on classifying a repair vs alteration	
NBIC Location Part: Repairs and Alterations; Section: Section 3	
Project Manager and Task Group P. Becker (PM), K. Moore, B. Underwood, P. Shanks, S. Chestnut, T. Seime	
Source (Name/Email) Pat Becker, pbecker@epri.com	
Statement of Need <p>Interpretations continue to be received based on confusion in current guidance given in Section 3, Part 3 of Repairs and Alterations. Of particular issue is the heavily relied upon 'List of Examples' of Repairs and Alterations. The lists are considered a 'shortcut' to understanding which activities should be classified as repairs and which should be alterations. However, the examples are not intended to be used without the understanding of the rest of the subject matter in Part 3, Section 3...nor are they all-inclusive or exclusive.</p> <p>Experience levels can vary widely among all 'stakeholder' categories, i.e. Owner/User, Authorized Inspector, Certificate Holder, In-Service inspector, Jurisdictional Authority etc.</p> <p>From the Forward: <i>The general philosophy underlying the NBIC is to parallel those provisions of the original code of construction, as they can be applied to post-construction activities. The NBIC does not contain rules to cover all details of post-construction activities. Where complete details are not given, it is intended that individuals or organizations, subject to the acceptance of the Inspector and Jurisdiction when applicable, provide details for post-construction activities that will be as safe as otherwise provided by the rules in the original code of construction.</i></p> <p>The Intent of any effort is to improve the user experience while being cognizant not to overly restrict. The task group is paying attention to industry concerns and suggestions including the potential impact of any changes to existing equipment and installations. Existing Interpretations are being 'walked thru' the decision tree and otherwise reviewed against the addition of any content. The goal is to provide clearer guidance with less conflicting or overlapping examples or information.</p>	
Background Information Update of Part 3, Section 3 to improve the user experience and to add a decision tree logic diagram to aid in use of the list of examples of alterations in 3.4.4.	
Existing Text <p style="text-align: center;">PART 3, SECTION 3 REPAIRS AND ALTERATIONS — REQUIREMENTS FOR REPAIRS AND ALTERATIONS</p> <p>3.1 SCOPE</p> <p>This section provides requirements and guidelines for materials, replacement parts, and methods used when performing repairs and alterations to pressure-retaining items. Specific repair or alteration methods for other types of pressure equipment are in NBIC Part 3, Section 6.</p> <p>3.2 GENERAL REQUIREMENTS FOR REPAIRS AND ALTERATIONS</p> <p>3.2.1 MATERIAL REQUIREMENTS FOR REPAIRS AND ALTERATIONS</p>	Proposed Text <p style="text-align: center;">PART 3, SECTION 3 REPAIRS AND ALTERATIONS — REQUIREMENTS FOR REPAIRS AND ALTERATIONS</p> <p>(NEW) 3.0 INTRODUCTION</p> <p><u>This Section provides information on the requirements for repairs and alterations to pressure retaining items. Information on how to classify, perform, and document acceptable repair and alteration activities may be found throughout the Sections of Part 3 and in Supplement X, Figure SX.1. It is the intent that Section 3 be used in cooperation with local jurisdictional authorities and with an understanding of the applicable pressure vessel code regulations relevant to the scope of repair or alteration activity. Note that the guidance herein and the examples given in 3.3.3 (Examples of Repairs) and 3.4.4 (Examples of Alterations) are not all inclusive and are intended to be representative of cases and activities commonly considered either a repair or alteration.</u></p> <p>3.1 SCOPE</p> <p>This section provides requirements and guidelines for materials and methods used when performing repairs and alterations to pressure-retaining items. Specific repair or alteration methods for other types of pressure equipment are in NBIC Part 3,</p>

(NEW)

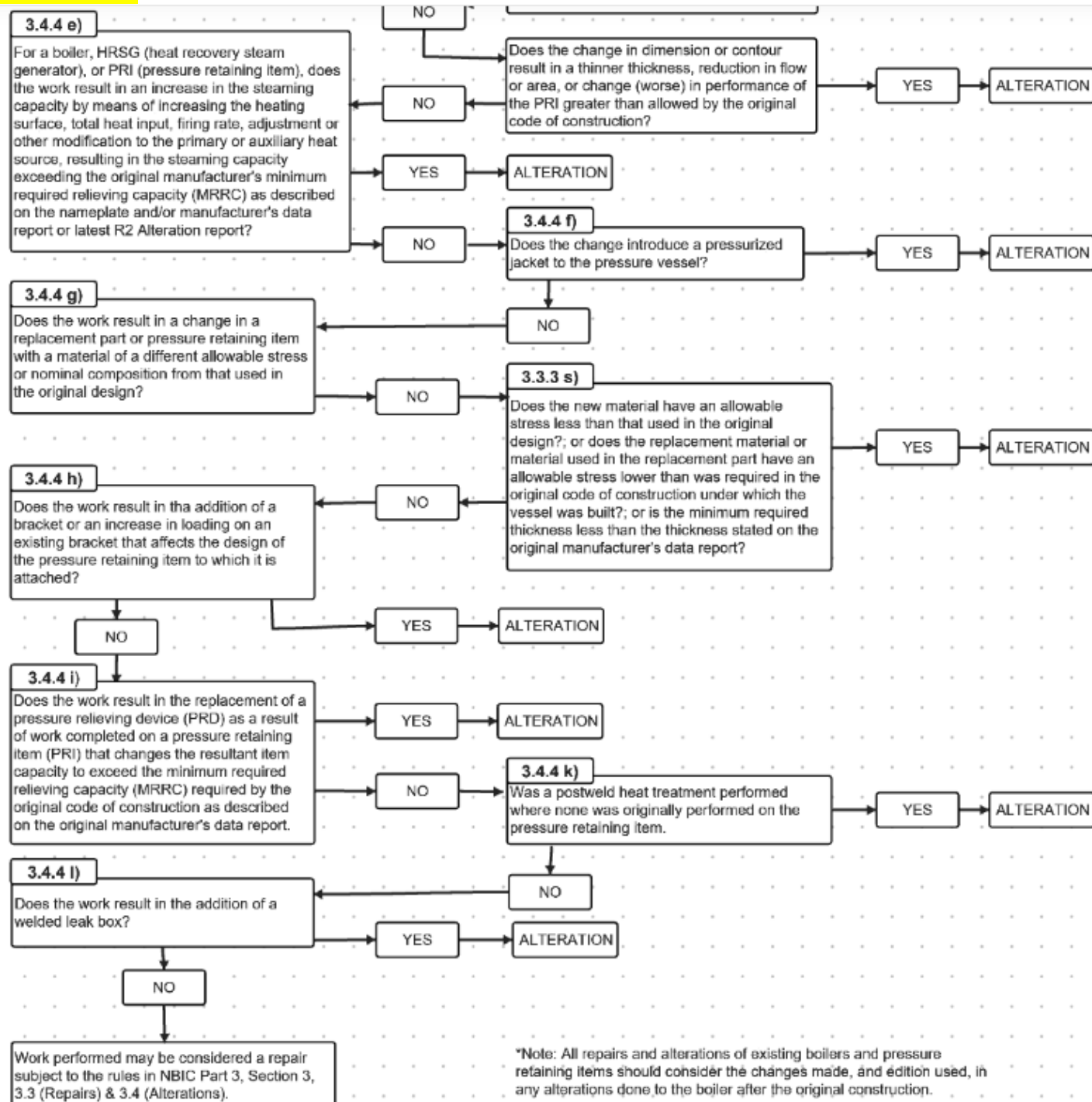
SUPPLEMENT X
CLASSIFYING REPAIRS AND ALTERATIONS

SX.1 SCOPE

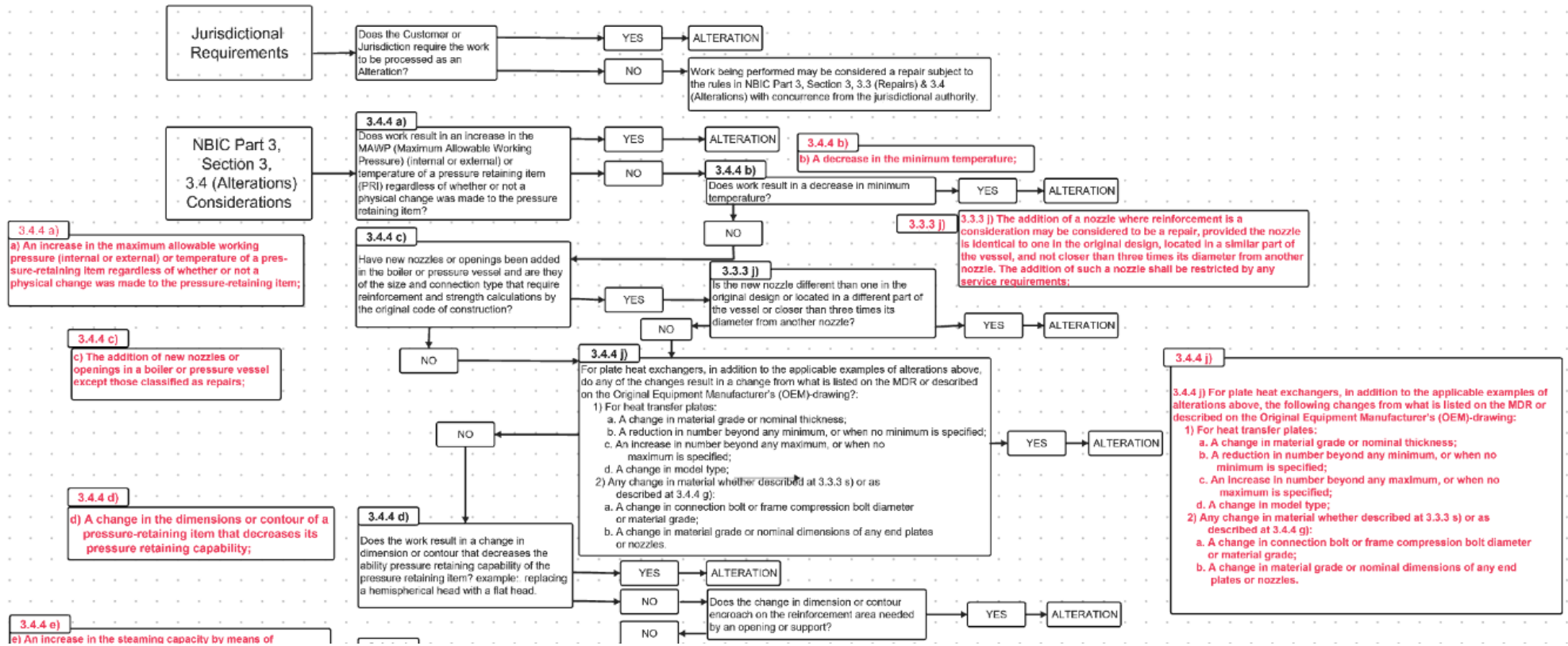
FIGURE SX.1
DECISION TREE (LOGIC DIAGRAM) FOR DETERMINING REPAIR OR ALTERATION ACTIVITY CLASSIFICATION
BASED ON PART 3, SECTION 3, 3.4.4, ALTERATION EXAMPLES

'Clean' copy without references

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(Showing diagram with 'Example' references from 3.3.3 and 3.4.4)



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 (PM), Robert Underwood, Melissa Wadkinson, Louis Dutra, Jonathan Ferreira, Matt Schaser, Donald Kinney,	
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
	<p>Practicable: An NBIC activity such as, but not limited to, a process, action, test, or examination that can be performed and/or accomplished.</p> <p>Practical: An NBIC activity such as, but not limited to, a process, action, test, or examination that is able to provide useful, functional, or suitable results.</p>

A21-43 - Negative vote justification

Benjamin Schaefer <bschaefer@aep.com>

Tue 7/16/2024 11:40 AM

To: Terrence Hellman <THellman@nationalboard.org>

Terry,

I voted against this item in Subgroup R&A July 2024 meeting. The definition of the "Practical" is acceptable, my objection has to do with the definition of "Practicable" which is too rigidly defined. The specific text "process, action, test, or examination that is able to be done or performed." does not leave any exception for safety of personnel or the equipment and does not allow the inspector to include those factors in the decision. Secondly, we have many uses of this term and all three parts of the NBIC and if the definition is added, all existing uses must conform to this definition, whether or not we want that much rigidity in the words of the paragraphs in which this term applies.

Ben Schaefer

Item A21-43 - rationale for negative - Siefert, SG-R&A

Siefert, John <jsiefert@epri.com>

Tue 7/16/2024 10:46 AM

To: Terrence Hellman <THellman@nationalboard.org>

Terry, I am not convinced we need the words practical or impracticable in Part 3. In most instances the inclusion of the words practical or impracticable seem redundant and unnecessary and they are not used very often. In this process, I would have started with the review to fully disposition if the two words are absolutely necessary before attempting to define one or both. Having said that, I am happy to be included on future correspondence to help improve and/or eliminate these words from the NBIC Part 3. Given the number of requests for interpretation and other confusion, I believe the better course of action(s) are to drop the words which would inherently eliminate the action to define them.

Best regards,

John Siefert, Ph.D.

Area Lead – Materials



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A21-43 Negative Vote

Spuhl Raymond - Hartford-Remote-HSB <raymond_spuhl@hsb.com>

Tue 7/16/2024 10:37 AM

To: Terrence Hellman <THellman@nationalboard.org>

Terry

My reason is that the proposal does not help the user. And most likely creates more work and issues that it solves.

If the new definition is published before all the usage is reviewed and changed it will result in the loss of the intent of the current wording.

A definition that is in webster does not need to be in the NBIC.

I would recommend defining practicable(as used in the NBIC) as when the activity can be performed and provide meaningful or useful results.

Raymond Spuhl
Manager Code Services

**The Hartford Steam Boiler
Inspection and Insurance Company**

One State Street

P.O. Box 5024

Hartford, CT 06102-5024

Telephone: +1 (314) 223-6603

raymond_spuhl@hsb.com

hsb.com

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A21-43 Disapproval vote at SG R&A

Triplett, Andrew <triplettal@ornl.gov>

Tue 7/16/2024 10:39 AM

To:Terrence Hellman <THellman@nationalboard.org>

Terry, as mentioned at the meeting, I believe the proposed definitions do not adequately cover how the terms practical and practicable are used in the NBIC, and do not provide an adequate level of consideration for the many, many factors in place when considering whether something is reasonable to perform for any given set of circumstances. I understand the desire to have a definition, but when it goes into the book it needs to actually fit the way the word is being used as opposed to us changing the word usage after the fact.

Andrew Triplett

Boiler and Pressure Vessel Program Lead

FIID / QMS / S&I Welding Services

Bldg. 7077B, Room 003, MS 6361

DESK: 865-241-5969

CELL: 865-272-9597

OAK RIDGE NATIONAL LABORATORY
MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

Engineered Alterations

NB23-09 Rev ~~5964~~Supplement ~~SXX??~~Pressure Retaining Parts fabricated using Additively Manufactured MaterialSection XX.1 Scope

Additively Manufactured (AM) pressure ~~retaining containing~~ parts ~~are parts that~~ have been fabricated ~~using material made~~ by the direct energy deposition (DED) process. The method of welding using DED shall be limited to the gas metal arc welding (GMAW) process, ~~and are referred to as AM parts~~. AM parts replicate pressure retaining parts that were previously made using wrought, forged or cast product forms. The requirements listed under Section XX.2 for installation of AM parts are based on references to other known international Codes and Standards (e.g., ASME Boiler and Pressure Vessel Code).

Section XX.2 Installation of AM Pressure Retaining Parts

AM parts ~~manufactured by the DED process~~ that are being installed by a National Board R-Certificate holder shall be considered an alteration and shall require a Form R-2. AM parts that are installed shall be limited to service temperatures below the creep range (e.g. where time independent properties govern).

In addition to the requirements for an alteration, the following ~~documents shall~~ information shall be provided for the AM part and attached to the NBIC Form R-2;

- (a) copy of the Additive Manufacturing Specification (AMS) .

As a minimum the following information shall be included in the AMS:

- a 1) The ~~governing original code of construction~~ Construction Code for the AM component.
- a2) File names with current revision for all model data describing the geometry and build strategy needed to ~~fabricate~~ build the physical component.
- a3) The applicable Material Specification listed in ~~the original code of construction for the pressure retaining item~~ ASME BPVC Section II, Part A or Part B.
- a4) The applicable Filler Metal Specification and AWS Classification listed in ~~the original code of construction~~ ASME BPVC Section II, Part C.
- a5) Allowable ranges of process variables from ~~the original code of construction~~ ASME BPVC Section IX, Part QW, Article VI, "Material Manufacturing using Wire Additive Welding".
- a6) The nondestructive evaluation and testing requirements being applied to the AM Material from the applicable ~~original code of construction~~ ASME BPV Construction Code.
- a7) Supplemental examination requirements identified by the Additive Manufacturer or the User.

a 8) Post-processing requirements identified by the Additive Manufacturer or the User.

 a9) Thermal treatment requirements for the AM Material identified by the Additive Manufacturer
 or the User.

 a10) Supplemental requirements identified by the Additive Manufacturer or the User
 (e.g., corrosion testing).

 a(11) ~~Prior to fabrication, the AMS Additive Manufacturing Specification~~ shall be reviewed and
 accepted by the Inspector, ~~and the Jurisdiction, where applicable~~ required.

(b) A copy of the design calculations for the AM pressure part which shall be based on the original code of construction.

(c) A copy of the original code of construction-ASME Section IX qualified welding procedure specification(s) that was followed for AM pressure part fabrication and weld/welder qualification record(s).

(d) A copy of the Additive ~~Material~~ Manufacturing Qualification Build Test Report.

As a minimum the following information shall be included in the AM Qualification Build Test Report:

 ~~d(1)~~ The Additive Manufacturer shall complete qualification builds prior to starting
 production builds.

 d(2) One qualification build is required for each F-Number (e.g., ASME BPVC Section IX, Table
 QW- 432) that captures the geometric features for the production components.

 d(3) The geometry produced for the qualification builds can be either:

 d3(a) A specific component geometry being built for production.

 d3(b) A generic component geometry containing geometric features that capture the bounding heat inputs and interpass temperature for multiple production components. Examples of geometric features can include but are not limited to thick wall sections, thin wall sections, tilted wall sections, nozzle sections, thickness transitions, and required joints (e.g., tees or cruciform).

 d3(c) Additional qualification builds are not required for a F-Number unless the geometric features for the qualification build in d)3 paragraph 7(c) do not bound the heat inputs and interpass temperatures for additional production builds.

 d(4) Sufficient AM ~~product Material~~ for qualification testing shall be produced to complete all required material qualification testing.

 d(5) Test specimens shall be extracted from the AM ~~product Material~~ produced during the qualification builds at bounding heat inputs and interpass temperatures (e.g., thick wall

_____ sections, thin wall sections, tilted wall sections, thickness transitions, and required joints, _____ etc-).

d(6) Test specimens shall be extracted from multiple locations as needed to define the bounding value of the material property of interest (i.e., the tensile strength and toughness may not be at a minimum at the same location).

d(7) If the test specimen population is < 15, then a statistical analysis shall be performed in accordance with ASTM E2586 to verify that the material properties of an extrapolated population meet or exceed the minimum specifications of the properties based on a 95% confidence interval. If verified, then the product properties are deemed acceptable.

~~If less than 15 test specimens are produced the Additive Manufacturer shall complete a statistical analysis to support with 95% confidence that 99% of the produced material tensile properties are in accordance with the material specification.~~

~~(8) The statistical analysis shall be in accordance with ASTM E2586.~~

Commented [MS1]: I think bullet 7 and 8 should be applicable for all mechanical properties, not just tensile. Therefore, I've written this in more general terms.

d(89) If the test specimen population is ≥ 15, and testing indicates that all the material properties exceed the minimum specifications then no statistical analyses are required and the product properties are deemed acceptable.

~~If 15 or more specimens are produced, and all the tensile properties meet the requirements of the material specification, the material is acceptable, and a statistical analysis is not required.~~

d(910) _____ The tensile data generated for the ASME BPVC Section IX, Part QW, Article VI Additive "Material Manufacturing Procedure Qualification Requirements" (Section c6) may be included in the calculation of the total number of test specimens.

d(101) _____ ~~Elemental Chemical~~ composition testing shall be performed and included in the AM Qualification Build Test Report in accordance with the requirements in Section f (g).

d(112) Mechanical property testing shall be performed and included in the AM Qualification Build Test Report in accordance with the requirements of Section (g and hg).

d(123) Metallographic testing shall be performed and included in the AM Qualification Build Test Report in accordance with the requirements of Section (k)h.

(e) copy of Production (witness specimen) Test Reports.

The following information shall be provided in the AM Production Test Report:

e(1) AM product witness specimens shall be manufactured and tested from each production build to document material integrity and stability of the manufacturing process.

Commented [MS2]: Is this the best word to use? Are we extracting these from a product or are these manufactured separately? Should we say, "obtained and tested"?

Commented [MS3]: Need to define specifically. Batch, lot, or every product item?

~~AM Material witness specimens shall be manufactured and tested for each production build to measure and verify on-going process stability.~~

~~e(2)~~ At least one AM ~~product Material~~ witness tension test specimen shall be manufactured and tested ~~from~~ each production build.

~~e(3)~~ When toughness testing is required by the Construction Code, at least one AM ~~product Material~~ witness toughness test ~~specimen~~ shall be manufactured and tested ~~from~~ each production build.

~~e(4)~~ ~~The AM product witness toughness test sample shall be of sufficient size to produce the required number of replicate specimens required by the original code of construction.~~

~~The AM Material witness toughness test specimen shall be of sufficient size to produce the number of toughness test specimens required by the Construction Code.~~

~~e(5)~~ When a production component requires the use of multiple heats of filler metal AM ~~product Material~~ witness specimens for tension and toughness testing shall be manufactured and tested from each heat of filler metal.

~~e(6)~~ The witness specimens shall be extracted from the AM ~~product Material~~ manufactured using bounding heat inputs and interpass temperatures that provides limiting values for tensile and toughness properties as determined by the Additive Manufacturer.

~~e(7)~~ The witness specimens shall be manufactured either immediately before, during, or immediately after each production build.

~~e(8)~~ All tension and toughness testing shall be performed in accordance with the requirements of Sections ~~g, h, and i) (e)~~.

~~e(9)~~ Following any production test non-compliance, components fabricated during the build shall be dispositioned using the Additive Manufacturers Quality Control Program.

~~e(10)~~ The results of the required witness specimen testing shall be documented in a Production Test Report certified by the Additive Manufacturer.

~~e(11)~~ The Production Test Report shall be included in the Additive Manufacturer's Construction Records.

~~(f)~~ ~~f).~~ ~~Elemental Chemical Composition Testing~~ **HEMICAL COMPOSITION TESTING**

~~(f1)~~ One AM ~~product Material~~ specimen from the qualification build shall be provided for ~~elemental chemical~~ composition testing at a location determined by the Additive Manufacturer.

~~(f2)~~ The analytical method for ~~elemental chemical~~ composition testing shall be in accordance with the Material Specification.

~~(f3)~~ The ~~elemental~~~~chemical~~ composition of the specimens shall conform to the ASME filler metal specification identified in the ~~AM Additive Manufacturing~~ Specification.

~~(g)~~ g). Mechanical Property Test Locations ~~MECHANICAL PROPERTY TESTING~~

~~(g14)~~ The build x, y, and z axes are defined in Figure 1.

~~(g22)~~ The z axis is defined as normal to deposition layers (Parallel to Build Direction) as shown in Figure 1.

h). Tension Testing ~~Requirements~~

~~(h14)~~ All AM ~~product~~ ~~Material~~ testing shall be performed on specimens in the final heat-treated condition identified in the ~~AM Additive Manufacturing~~ Specification.

~~(h22)~~ Tension test specimens shall be constructed with their long direction parallel to the z-axis as shown in Figure 1.

~~(h33)~~ All room temperature tension testing shall be in accordance with ASTM E8 (see Appendix A and B)

~~(h44)~~ All elevated temperature tension testing shall be in accordance with ASTM E21 (see Appendix A and B).

i). Hardness Testing ~~Requirements~~

~~(i14)~~ Hardness testing shall be performed on the AM product from the qualification build when required by the Material Specification, the code of construction, or the AMS.

~~Hardness testing shall be performed on AM Material extracted from the qualification build when required by the Material Specification, the Construction Code, or the Additive Manufacturing Specification.~~

~~(i22)~~ The hardness testing shall be performed on the AM ~~product~~~~Material~~ specimen in regions of the highest tensile strength.

~~(i33)~~ Hardness testing shall comply with ASTM E10, ASTM E18 or ASTM E92.

~~(i44)~~ The hardness values for the AM ~~product~~ ~~material~~ shall comply with the Material Specification.

~~j).~~ Toughness Testing ~~Requirements~~

~~(j14)~~ Toughness testing shall be performed when required by the Material Specification, Construction Code or the ~~Additive Manufacturing Specification~~ ~~AMS~~.

~~(j22)~~ When toughness testing is required, toughness testing shall be performed on AM ~~product~~ ~~Material~~ ~~extracted~~ from the qualification build and the witness specimens.

~~(j33)~~ Toughness testing shall be performed in the AM ~~product~~ ~~Material~~ specimen orientation as shown in Figure 1.

Commented [MS4]: Do you need to extract material to perform the test, or do you perform the test on the finished product?

Commented [GG5R4]: Both can be used. Depends on location and function.

~~(i44)~~ The acceptance criteria for toughness testing shall be as specified by the ~~applicable original code of construction~~Construction Code.

~~(h) k).~~ ~~M~~Metallographic Examination Requirements~~ETALLOGRAPHIC EVALUATIONS~~

~~(k14)~~ Metallographic specimens shall be extracted from the AM product Material produced during the qualification builds at bounding location of heat inputs and interpass temperatures as determined by the Additive Manufacturer.

~~(k24)~~ Metallographic specimens shall be prepared using methods prescribed in ASTM E3, Standard Guide for Preparation of Metallographic Specimens and ASTM E407, Standard Practice for Microetching Metals and Alloys.

~~(k34)~~ The microstructure shall be examined at magnifications ranging from 50X to 200X at locations selected by the AM to ensure the desired microstructure has been achieved.

~~(k44)~~ The microstructure shall be reasonably uniform and free of cracks and lack of fusion ~~d~~Defects at the selected locations in section k) 3.

~~l).~~ ~~(i)~~ A copy of nondestructive test reports as required by the original code of construction and Owner/User contract specification requirements, if applicable.

~~m).~~ Test results from sections f),h), i), j) and k) shall be documented in a certified test report.

~~n).~~ ~~(j)~~ Results of the hydrostatic test as performed in accordance with the rules of the original code of Construction.

~~o).~~ Certification of AM pressure parts shall be documented on the NBIC Form R-3.

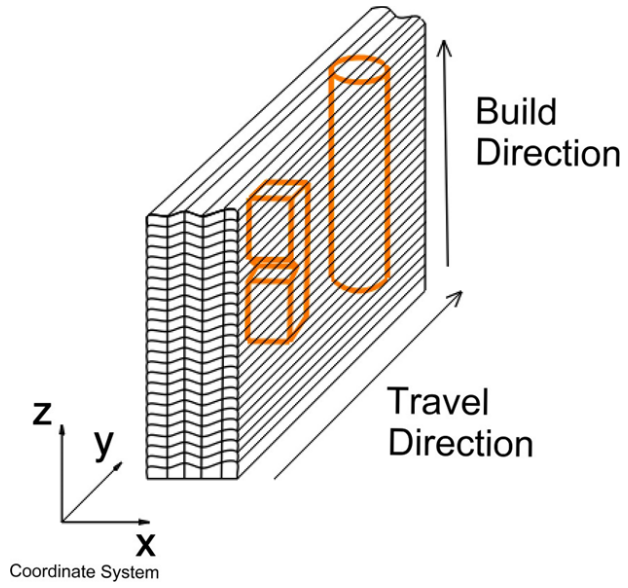


Figure 1 Material Manufacturing Coordinate System and Material Test Specimen Orientation

Appendix A Control Points and Data Point Definitions and Nomenclature

Point	Temperature	Strength	Description	Criteria
C1	Room	TS	Specified Minimum Tensile Strength	Specified Minimum Tensile Strength from the Material Specification
C2	Room	TS	The measured elongation from the tensile specimen is equal to the specified minimum elongation value in the Material Specification.	Specified Minimum Elongation from the Material Specification. Note: If the elongation in all the tensile specimens exceeds the specified minimum elongation it is not required that Control Point C2 be determined.
C3	Design	TS	Value from Table U at Design Temperature	Tensile Strength from ASME BPVC Section II, Part D, Table U at Design Temperature
C4	Design	TS	Minimum Acceptable Value of Tensile Strength for High Temperature Test	Point C3/1.1 (See Paragraph 6(e)(3)) Value from Table U at Design Temperature Divided by 1.1
C5	Room	YS	Specified Minimum Yield Strength	Specified Minimum Yield Strength from the Material Specification
C6	Room	YS	The measured elongation from the tensile specimen is equal to the specified minimum elongation value in the Material Specification.	Specified Minimum Elongation from the Material Specification. Note: If the elongation in all the tensile specimens exceeds the specified minimum elongation it is not required that Control Point C6 be determined.
C7	Design	YS	Minimum Acceptable Value of Yield Strength for High Temperature Test	Yield Strength from ASME BPVC Section II Part D Table Y-1 at Design Temperature
D1	Room	TS	Minimum value of tensile strength from ASME BPVC Section IX, Part QW, Article VI tension test data	Tensile strength and elongation from the ASME BPVC Section IX, Part QW, Article VI tension tests shall equal or exceed the specified minimum values in the Material Specification (Point C1) The elongation from the tension tests shall exceed the specified minimum elongation in the Material Specification
D2	Design	TS	Tensile strength value from elevated temperature tension test.	Tensile strength value from ASME BPVC Section IX, Part QW, Article VI tension test shall equal or exceed value calculated for Point C4
D3	Room	YS	Minimum value of yield strength from ASME BPVC Section IX, Part QW, Article VI tension test data	Yield strength and elongation from the ASME BPVC Section IX, Part QW, Article VI tension tests shall equal or exceed the specified minimum values in the Material Specification (Point C5) The elongation from the tension tests shall exceed the specified minimum elongation in the Material Specification
D4	Design	YS	Yield strength value from high temperature tension test	Yield strength value from ASME BPVC Section IX, Part QW, Article VI tension test shall equal or exceed value for Point C7

Appendix B Example Section IX, Part QW, Article VI Data Analysis

Given the test data shown below determined from a QW -600 bracketed weld qualification testing, calculate the allowable minimum yield and tensile strength values to be used for acceptance of the tensile test specimens for qualification and production witness specimens.

Target Material Specification - ASME SA-403 Grade 316L

Filler Material Specification - ER316LSi

Control Points - Example Data SA 403 Grade 316L (ksi)

C1	C2	C3	C4	C5	C6	C7
70	Elongation Controlled	59.7	59.7/1.1=54.3	25	Elongation Controlled	14.1

Example 1

Data Point D1 = 74 ksi

Data Point D2 = Control Point

C4 = 54.3 ksi

Data Point D3 =

30 ksi

Data Point D4 = Control Point C7= 14.1 ksi

Calculate the Minimum Allowable Tensile Strength and Yield Strength for the Qualification Build Specimen and the Production Witness Specimens Builds Specimen using Equation 1 and 2.

$$AMTS_{\text{Minimum}} = \text{Max} [C1, D1 \times C4/D2] = \text{Max} [70, 74 \times 54.3/54.3] = 74 \text{ ksi}$$

$$AMYS_{\text{Minimum}} = \text{Max} [C5, D3 \times C7/D4] = \text{Max} [25, 30 \times 14.1/14.1] = 30 \text{ ksi}$$

Example 2

Data Point D1 = 74 ksi

Data Point D2 = Control Point

C3 = 59.7 ksi Data Point D3 =

30 Ksi

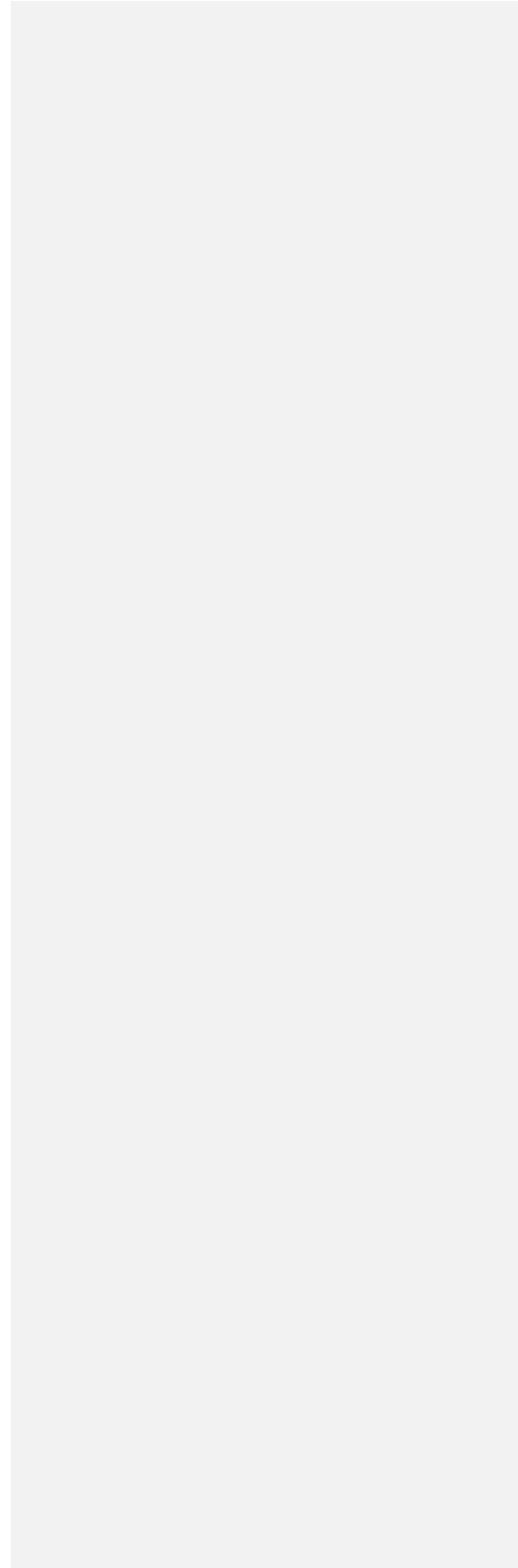
Data Point D4 = 17 ksi

Calculate the Minimum Allowable Tensile Strength and Yield Strength for the Qualification Build Specimen and the Production Witness Specimens Builds Specimen using Equation 1 and 2.

$$AMTS_{\text{Minimum}} = \text{Max} [C1, D1 \times C4/D2] = \text{Max} [70, 74 \times 54.3/59.7] = 70 \text{ ksi}$$

$$AMYS_{\text{Minimum}} = \text{Max} [C5, D3 \times C7/D4] = \text{Max} [25, 30 \times 14.1/17] = 25 \text{ ksi}$$

|





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PROPOSED REVISION OR ADDITION

Item No. A 23-21 Rev 00	
Subject/Title TUBE PLUGGING IN BOILERS BY WELDING	
NBIC Location 3.3.4.9	
Project Manager and Task Group Eric Cutlip (PM), Kathy Moore, Tom White, Andrew Triplett, Philip Gilston	
Source (Name/email)	
Statement of Need While rules are included in NBIC Part 3 for plugging of tube in firetube boilers, no corresponding rules exist for plugging of tubes in watertube boilers.	
Background Information	
Existing Text 3.3.4.9 TUBE PLUGGING BY WELDING 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. a) When installing a welded firetube plug, the repair may be limited by the number of tubes plugged and their location. The operational effects on the waterside pressure boundary and reduced heat transfer (e.g. potential for overheating of remaining tubes) should be considered prior to plugging. Competent technical advice should be obtained from the manufacturer of the pressure-retaining item or from another qualified source. b) 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.	Proposed Text 3.3.4.9 TUBE PLUGGING BY WELDING 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 or bore hole may be plugged. a) When installing a welded firetube plug, the repair may be limited by the number of tubes plugged and their location. The operational effects on the waterside pressure boundary and reduced heat transfer (e.g. potential for overheating of remaining tubes) should be considered prior to plugging. Competent technical advice should be obtained from the manufacturer of the pressure-retaining item or from another qualified source. b) 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, drum, header, or a combination of both thereof.

<p>c) Cracking of ligaments due to the use of welded plugs is a common issue. To mitigate this possible occurrence the “R” Certificate Holder performing the repair shall consider actions including but not limited to the following:</p> <ol style="list-style-type: none"> 1) For P-No. 1 and 3 materials, preheating to 200°F (95°C) minimum. 2) Limiting the maximum weld size to 3/8” (10 mm). 3) Limiting electrode size to 1/8” (3 mm) maximum diameter. 4) Using a stringer bead technique. 5) Using a minimum of two passes. <p>d) NDE in lieu of pressure testing is not permitted.</p>	<p>c) Cracking of ligaments due to the use of welded plugs is a common issue. To mitigate this possible occurrence the “R” Certificate Holder performing the repair shall consider actions including but not limited to the following:</p> <ol style="list-style-type: none"> 1) For P-No. 1 and 3 materials, preheating to 200°F (95°C) minimum. Higher P-No. materials may have additional preheat, PWHT, and welding parameter requirements. 2) Limiting the maximum weld size to 3/8” (10 mm). 3) Limiting electrode size to 1/8” (3 mm) maximum diameter. 4) Using a stringer bead technique. 5) Using a minimum of two passes. <p>d) NDE in lieu of pressure testing is not permitted for Firetube Boiler applications.</p>
---	--

Committee	VOTE				Passed	Failed	Date
	Approved	Disapproved	Abstained	Not Voting			

A23-21 Abstention

Davis, Paul (US) <paul.davis22@woodplc.com>

Tue 7/16/2024 11:17 AM

To: Terrence Hellman <THellman@nationalboard.org>

My reason for abstaining is that I do not believe this item provides a clear distinction between welded repairs to boiler tube plugs where weld strength calculations are required vs. when a mechanical plug with seal weld is used. I think this item needs to be clarified.

Paul Davis

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abstain from voting 23-21

Ferreira Jonathan - Hartford-Remote-HSB <Jonathan_Ferreira@hsb.com>

Tue 7/16/2024 11:19 AM

To:Terrence Hellman <THellman@nationalboard.org>

Terry,

I abstain from voting on 23-21 as I think the current proposed verbiage seems to imply that calculations are required for all welded tube plugs. I also think it may be best to separate water tube boiler plugging from firetube boiler plugging.

Best Regards,

Jon Ferreira

Technical Service Manager
Global Inspection and Engineering Services

The Hartford Steam Boiler Inspection and Insurance Company

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A23-21 - Tube plugging - Abstention

Benjamin Schaefer <bschaefer@aep.com>

Tue 7/16/2024 12:17 PM

To: Terrence Hellman <THellman@nationalboard.org>

Cc: Benjamin Schaefer <bschaefer@aep.com>

Existing rules for water tube boiler for years, have been settled with agreement between the Inspector and certificate holder. Secondly, requirements for plugging of water tube boilers may be needed but I don't think it should come from the requirements of plugging firetube boilers.

A23-21 – Ben Schaefer voting – Abstain – July 2024 meeting

Item 23-21 NO Vote

Louis Dutra <ldutra@baycityboiler.com>

Tue 7/16/2024 11:25 AM

To: Terrence Hellman <THellman@nationalboard.org>

Terry,




The reason for the no is there is not enough definition of the boiler types I.E ,package firetube boilers are different then some firetube boilers. Per code we need to determine why the tube failed weather it is oxygen corrosion, scale or electrolysis. And plugging a fire tube boiler you are not following this process. I feel watertube and fire tubes boilers need to fall under different rules based on design.

Thank you!

**Louis Dutra**

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QA/QC Manager

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SG RA A23-21

Craig Hopkins <chopkins@seattleboiler.com>

Tue 7/16/2024 11:25 AM

To: Terrence Hellman <THellman@nationalboard.org>

Terrance,

I voted NO on item A23-21 regarding proposed changes to 3.3.4.9.

My rationale for voting NO is that criteria and considerations for plugging of firetube and watertube boilers can be very different. Attempting to modify the existing language of 3.3.4.9, which was written and approved specifically for firetube boilers, by incorporating the same criteria and considerations for watertube boilers only serves to obscure the differences between plugging actions in the two different boiler types. This proposed change would not be beneficial for plugging either firetube or watertube boilers.

Thank you.

Craig Hopkins

Best Regards,

Terrence Hellman

Senior Staff Engineer

Email: thellman@nbbi.org

Phone: 614-431-3234

Fax: 614-847-1828



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A23-21

McBee, Timothy <Timothy.McBee@tuvsud.com>

Tue 7/16/2024 11:13 AM

To: Terrence Hellman <THellman@nationalboard.org>

Terry,

I disapprove as seal welding of driven plugs is not clearly defined.

Respectfully,

Tim McBee

Manager of Codes and Standards

Phone: 217-412-9300

Email address: Timothy.McBee@tuvsud.com



Business address

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abstention A23-21

Seime, Trevor S. <tsseime@nd.gov>

Tue 7/16/2024 11:15 AM

To:Terrence Hellman <THellman@nationalboard.org>

The reason for my abstention is that I believe this needs to be 2 separate paragraphs with the requirements for each type clearly pointed out.

Trevor Seime

Office of the Director • Boiler Inspection Program • Chief Boiler Inspector

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PROPOSED REVISION OR ADDITION

Item No. A23-24	
Subject/Title GENERAL REQUIREMENTS FOR REPAIRS TO QUICK-ACTUATING/QUICK-OPENING CLOSURES	
NBIC Location New SUPPLEMENT XX	
Project Manager and Task Group Tim McBee (PM), Chuck Becker, Matt Schaser, Robert Smith, Aziz Khssassi	
Source (Name/Email) Kathy Moore (kathymoore@joemoorecompany.com)	
Statement of Need There are many small stamp holders (which I am one of them) that do not understand the "uniqueness" of these repairs. I would like to see some engineering controls as part of this "section".	
Background Information The NBIC currently has no specific safe guidelines for Quick-Actuating/Quick-Opening repairs.	
Existing Text None	Proposed See attached

COMMITTEE	VOTE:				Passed	Failed	Date
	Approved	Disapproved	Abstained	Not Voting			

A23-24
SUPPLEMENT XX
GENERAL REQUIREMENTS FOR REPAIRS TO QUICK-ACTUATING/QUICK-OPENING CLOSURES

SXX.1 SCOPE

This supplement provides additional requirements and guidelines above and beyond those cited in the main body of the NBIC code for repairs to quick-actuating/quick-opening closure pressure-retaining components referred throughout this supplement as "Quick Closures". Special consideration shall be given to meet the requirements set forth in NBIC Part 3, Section 2 through 5 as appropriate and inspection requirements identified in paragraph 2.3.6.5 in NBIC Part 2.

The components of quick closures include but are not limited to the following:

- a) Cover (Head, Flat Plate, etc.)
- b) Support Elements (Davit Hinge, Post Davit, Vertical/Slide Sides, etc.)
- c) Locking Elements (Wedges, Latch, etc.)
- d) Locking Mechanism (Rotating Locking Ring, Seal Flanges, Lugs etc.)
- e) Holding Elements (Pins)
- f) Interlock Device (Pressure Indicating Device)
- g) Seal design

SXX.2 REPLACEMENT PARTS FOR QUICK CLOSURES

- a) No components furnished or specified by the Manufacturer of the quick closure shall be removed unless Manufacturer's concurrence is received. In the event the original Manufacturer is no longer available, components shall not be removed.
- b) Replacement pressure retaining parts shall be identical to the original equipment furnished. Substitutions may be allowed if they are approved by the Manufacturer.
- c) Quick closure replacement pressure-retaining parts shall be fabricated in accordance with the Manufacturer's design and the original code of construction.
- d) Replacement of the nonpressure-retaining load bearing parts, when different from the Manufacturer's design, shall be evaluated for any possible effect on the pressure-retaining parts.
- e) Replacement materials, including welding materials, shall be consistent with the original materials of construction, including heat treatment.

SXX.3 REPAIR GUIDE FOR QUICK CLOSURES

- a) The Manufacturer's Data Report or Manufacturer's drawings when available, shall be carefully reviewed to determine the material of construction of each quick closure. If material data is not available, positive material identification (PMI) to identify the material's chemistry and hardness testing shall be performed.
- b) Weld repairs performed in accordance with NBIC Part 3 are permitted on quick closure pressure-retaining components that are manufactured from steel. Hinge pins or bolts shall not be welded. Special attention shall be paid to any requirements for the finished weld profile and PWHT.
- c) Structural deterioration or damage caused by corrosion, thinning, or cracking shall not be repaired until its extent has been determined by suitable nondestructive examination.
- d) The Certificate Holder shall have a plan covering the scope of the repair. The plan shall ensure that the work involved is compatible with the original design specification and good engineering practices.

- e) Removing the quick closure mechanism components from one vessel for the installation on another vessel is STRICTLY PROHIBITED.
- (f) When quick closures are repaired, the locking mechanism or locking device shall be operational per the quick closure Manufacturer's specifications.

SXX.4 ROUTINE REPAIRS

The following examples of repairs do not require stamping or nameplate attachment provided the repair procedure has been accepted by the Repair Inspector and the R-Certificate Holder has verified there will be no effect on the pressure-retaining capability of the quick closure.

- a) Replacement of consumable parts, for example wedges.
- b) Alignment adjustments

SXX.5 REPAIR OF DAMAGE

SXX.5.1 REPAIR OF QUICK CLOSURE WELDS

All welds associated with the quick closure pressure-retaining components should be repaired in accordance with the original manufacturer's design specifications. Special attention shall be paid to any requirements for the finished weld profile and PWHT.

SXX.5.2 REPAIR OF QUICK CLOSURE SURFACES

The repair of quick closure surfaces shall be limited to the restoration of wasted areas through weld build-up. The final surface shall be flush with nominal surface. Seating surfaces shall be machined back to original design specifications. External weld build-up is prohibited on closure components. Alternatively, Fitness-for Service (FFS) may be used to qualify local thin areas.

SXX.5.3 REPAIR OF QUICK CLOSURE MECHANISM

- a) The designs of quick closure locking mechanisms are typically proprietary; therefore, all repairs shall be performed to restore the closure to the original design specifications. If design specifications, such as original quick closure configuration and nominal thicknesses are not available, then all repairs shall be performed by the original manufacturer. If this is not practicable, the Certificate Holder shall contact an organization competent in quick-actuating/quick-opening closure design and construction to approve or establish a repair plan prior to implementing any repairs.
- b) Safety devices (sensors, interlocks, etc.) removed during maintenance or repair shall be reinstalled per the original manufacturer's specifications.
- c) Repairs shall avoid damaging gasket materials. If damage occurs to gasket materials, the gaskets shall be replaced before returning system back into service.

SXX.6 EXAMINATIONS AND TEST METHODS

NBIC Part 3, Section 4 is applicable for all post construction activities pertaining to examination and testing.

SXX.7 CERTIFICATION/DOCUMENTATION AND STAMPING

NBIC Part 3, Section 5 is applicable for all post construction activities pertaining to certification/documentation and stamping.

Stamping may also be waived per SXX.4 of this Supplement.



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PROPOSED REVISION OR ADDITION

Item No. A 23-39
Subject/Title Strengthening Prevention of Defect Recurrence
NBIC Location Part: Repairs and Alterations; Section: 3; Paragraph: Paragraph 1 (3.3.1)
Project Manager and Task Group Jon Ferreira (PM), Tom White, Jamie Walker and Adam Henson
Source (Name/Email) Adam Henson / adam.henson@csb.gov
Statement of Need The existing text recommends, but does not require an investigation of the cause, extent, and likelihood of recurrence of defects. The existing text also has no requirement for anyone to act to prevent the recurrence of defects. Where root and/or proximate causes of defects are known, or could be determined, someone needs to act to prevent catastrophic failure of equipment.
Background Information On April 3, 2017, an explosion occurred at the Loy-Lange Box Company in St. Louis, Missouri. The incident occurred when the bottom head of a pressure vessel called a semi-closed receiver (SCR), which was used in the company's steam generation system, catastrophically failed. The SCR was launched in the air as the result of the explosion and landed on a neighboring business. One employee of the Loy Lange Box Company and three members of the public were fatally injured. The U.S. Chemical Safety and Hazard Investigation Board (CSB) investigated this incident and learned during the investigation that the SCR was repaired by an R stamp organization in 2012 five years prior to the incident. During the repair, a wasted area of the bottom head of the SCR was flush patched. The cause of the defect was determined to be oxygen pitting corrosion. Evidence gathered during the investigation suggests that the defects in the head were not fully removed during the repair activity. The R stamp organization stated during the investigation that Loy-Lange requested an "emergency repair" following the discovery of a leak from the SCR. The R stamp organization stated further that they interpreted this to mean the repair needed to be completed immediately, presumably so production could resume as normal. This was not the first time the SCR leaked. The vessel leaked previously in April 2004, August 2012, and November 2012. In addition to causing these leaks oxygen pitting corrosion was also discovered in other parts of Loy Lange's steam system. During the investigation, the CSB noted that no effort was made to determine the extent of the oxygen pitting corrosion in the steam generation system, including the SCR, and that Loy Lange's operating practices up to the date of the incident were such that oxygen levels within the steam generation system were not effectively managed. Had the level of oxygen within the steam generation system been effectively managed following any of the leaks repaired over the years the 2017 incident would not have happened. Full details of the Loy-Lange Box Company Pressure Vessel Explosion are available at this link: https://www.csb.gov/loy-lange-box-company-pressure-vessel-explosion/



**THE NATIONAL BOARD
OF BOILER AND PRESSURE VESSEL INSPECTORS**

PROPOSED REVISION OR ADDITION

Item No. A 23-41
Subject/Title Strengthening Requirements for Defect Removal When Patching
NBIC Location Part: Repairs and Alterations; Section: 3; Paragraph: 3.3.4.6 a) 1) & 2)
Project Manager and Task Group PM - Aziz Khssassi, B.Schaefer, C.Hopkins, P.Shanks, A.Henson, P.Gilston & L.Ponce
Source (Name/Email) Adam Henson / adam.henson@csb.gov
Statement of Need The existing text requires the removal of defective material until sound material is reached but provides no requirements or guidance on means to employ to ensure complete removal of defective material. The means to ensure defects have been removed must be understood by all to ensure safety. There is an interpretation of the 2021 NBIC that compounds this issue permitting repair organizations to not follow the requirements of NBIC Part 3, 3.3.4.8 even when the characteristics of the defect cannot be fully established.
Background Information On April 3, 2017, an explosion occurred at the Loy-Lange Box Company in St. Louis, Missouri. The incident occurred when the bottom head of a pressure vessel called a semi-closed receiver (SCR), which was used in the company's steam generation system, catastrophically failed. The SCR was launched in the air as the result of the explosion and landed on a neighboring business. One employee of the Loy Lange Box Company and three members of the public were fatally injured. The U.S. Chemical Safety and Hazard Investigation Board (CSB) investigated this incident and learned during the investigation that the SCR was repaired by an R stamp organization in 2012 five years prior to the incident. During the repair a wasted area of the bottom head of the SCR was flush patched. The cause of the defect was determined to be oxygen pitting corrosion. Evidence gathered during the investigation suggests that the defects in the head were not fully removed during the repair activity. The R stamp organization stated during the investigation that Loy-Lange requested an "emergency repair" following the discovery of a leak from the SCR. The R stamp organization stated further that they interpreted this to mean the repair needed to be completed immediately, presumably so production could resume as normal. To make the repair the R stamp organization cut the SCR shell from the bottom head, leaving the bottom head attached to the skirt. An employee who oversaw the repair stated that they observed pitting corrosion damage in the bottom head. They cut a hole in the center of the head where they believed the corrosion was isolated and applied a flush patch. They believed they removed all corrosion damage through this process. When asked what techniques they relied upon to determine the complete removal of defects the employee replied that they would have been able to see additional pitting and that with the hole cut in the head they were able to match up the patch with the existing metal to verify the thickness of the remaining metal of the head. Besides being able to see differences in the thickness of the patch and the remaining metal of the head, this employee also reported that they would have been able to feel the difference too. Another employee reported measuring the thicknesses of the two pieces with a tape measurer and verified the thickness of both pieces to be ¼ inch. The evidence the CSB gathered demonstrating the likeliness that repair did not remove all defective material from the SCR is discussed in Section 1.6 SCR Post-Failure Examination starting on page 26 of the report. Had all defective material been removed during this repair the incident may not have happened. Full details of the Loy-Lange Box Company Pressure Vessel Explosion are available at this link: https://www.csb.gov/loy-lange-box-company-pressure-vessel-explosion/ INTERPRETATION 21-13 Subject: Repair of pressure-retaining items without complete removal of defect Edition: 2021 Question: If the characteristics of the defect cannot be fully established, would the provisions of NBIC Part 3, 3.3.4.8 be applicable? Reply: No.

Existing Text	New Proposed Text (09 Jan 2024)
<p>3.3.4.6 PATCHES</p> <p>a) Flush Patches</p> <p>1) The weld around a flush patch shall be a full penetration weld and the accessible surfaces shall be ground flush where required by the applicable original code of construction. Examples of welded flush patches are shown in NBIC Part 3, Figure 3.3.4.6-a. Nondestructive examination shall be performed in accordance with the requirements from NBIC Part 3, Section 4.2.</p> <p>2) Before installing a flush patch, defective material shall be removed until sound material is reached. The patch shall be formed to the proper shape or curvature. The edges shall align without overlap. In stayed areas, the weld seams should come between staybolt rows or riveted seams. Patches shall be made from a material whose composition and thickness meet the intended service. Patches may be any shape or size. If the patch is rectangular, a minimum radius of not less than three times the material thickness shall be provided at the corners. Square corners are not permitted. The completed welds shall meet the requirements of the original code of construction.</p>	<p>3.3.4.6 PATCHES</p> <p>a) Flush Patches</p> <p><u>1) Examples of welded flush patches are shown in NBIC Part 3, Figure 3.3.4.6-a.</u></p> <p><u>2) Defects should be evaluated in accordance with 3.3.1 & 3.3.4.1.</u></p> <p><u>3) Before installing a flush patch, defective material shall be removed until sound material is reached. The area adjacent to the flush patch opening should be measured to ensure it is at or above the required minimum thickness as per the original Code of construction.</u></p> <p><u>4) Patches shall be made from a material whose composition and thickness meet the intended service.</u></p> <p><u>5) Patches may be any shape or size. Square corners are not permitted except where the flush patch intersects with an existing weld seam. If the patch is rectangular, a minimum radius of not less than three times the material thickness shall be provided at the corners. Square corners are not permitted.</u></p> <p><u>6) The patch shall be formed to the proper shape or curvature.</u></p> <p><u>7) The edges of the opening and patch shall be prepared for welding to ensure full penetration welds.</u></p> <p><u>8) The edges patch shall align be fitted and aligned without overlap. The fit-up and tack welding shall be inspected in accordance with the original code of construction. In stayed areas, the weld seams should come between staybolt rows or riveted seams.</u></p> <p><u>9) The weld around a flush patch shall be a full penetration weld and the accessible surfaces shall be ground flush where required by the applicable original code of construction.</u></p> <p><u>10) Nondestructive examination shall be performed in accordance with the requirements from NBIC Part 3, Section 4.2.</u></p> <p><u>11) The completed welds shall meet the requirements of the original code of construction.</u></p>

Proposed

VOTE:

COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

ASME PCC-2 articles:

Article 212 - Fillet Welded Patches

212-2 LIMITATIONS

....
 (c) This repair method shall not be used where the damage mechanism, the extent of damage, or likely future damage cannot be characterized. This repair method may be used in certain cases on areas with local crack-like flaws, provided

- (1) the growth has stopped, been arrested, or can be accurately predicted for all propagation modes
- (2) the effect of the flaw is evaluated using detailed analyses

212-3 DESIGN **212-3.1 General**

....
 (b) In general, the patch material and welding filler metal should be the same or very similar (e.g., compositional, physical, and mechanical properties) to that of the pressure component's original construction. Repair material selection shall consider, as a minimum, characteristics such as chemistry, weldability, physical properties (such as coefficient of thermal expansion), mechanical properties (such as strength, ductility, notch toughness), and compatibility with the process medium.

(c) The thickness of the patch plate is dependent on material mechanical properties and the calculated attachment weld sizes.

(d) The size (length and width) of the patch plate is governed by the requirement that all attachment welds be located on sound base metal completely encompassing the damaged area(s) (see Figure 212-1-1). The repair plate shall also be large enough to encompass any additional area(s) anticipated to experience similar or related damage during the life of the repair. The patch plate should overlap sound base metal by at least 25 mm (1 in.).

212-4 FABRICATION

(a) Plate edges may be cut to shape and size by mechanical means such as machining, shearing, grinding, or by thermal means such as flame or arc cutting. If thermal means are used, a minimum of 1.5 mm (1/16 in.) additional material shall be removed by grinding or machining. If the repair plate is greater than 25 mm (1 in.) thick, and the fillet weld size is less than the plate thickness, the weld prep edges shall be examined by magnetic particle (MT) or liquid penetrant (PT) methods to check for laminations. Laminations shall be cause for rejection unless repaired or found acceptable by fitness-for-service analysis in accordance with API 579-1/ASME FFS-1.

(b) The patch plate may be formed to the required shape by any process that will not unduly impair the mechanical properties of the patch plate material. Where required due to repair plate size or access/interference considerations, split sections may be used when joined by full penetration welds.

(c) Parts to be fillet welded shall be fit as tightly as practical to the surface to be welded and in no event shall be separated by more than 5 mm (3/16 in.). If the separation at the faying edge of the plate is 1.5 mm (1/16 in.) or greater, the size of the perimeter weld shall be recalculated by adding the amount of the separation to the eccentricity, e.

(d) Welding procedures, welders, and welding operators shall be qualified in accordance with the current requirements of the applicable construction code or postconstruction code. If not otherwise specified, ASME BPVC, Section IX may be used for procedure and performance qualification. Article 210 should be consulted for inservice welding issues; Article 214 should be consulted for field heat treating issues.

212-5 EXAMINATION

(a) Patch plate attachment welds shall be examined in accordance with the applicable construction code or postconstruction code by either the MT or PT methods if not temperature limited by the test methods. If not otherwise specified by the applicable construction code or postconstruction code, NDE shall be performed using procedures written and qualified in accordance with ASME BPVC, Section V.

(e) The examination acceptance criteria of the applicable construction code or post-construction code shall apply.

212-6 TESTING

(a) Testing shall be performed in accordance with the applicable post-construction code.

(b) The pressure component and installed patch plate(s) should be leak tested in accordance with the applicable post-construction code. Special safety precautions should be taken when pneumatic leak testing is performed.

(c) If permitted by the applicable post-construction code, nondestructive examination may be performed as an alternative to leak testing. Also, an initial service inspection may be performed of all weld joints after the pressure component has returned to normal operating pressure and temperature, if these were reduced while welding was performed.

Comments received in June 2024

Comments / Propositions	Contact
I appreciate your work on this item (and others) and your commitment to the NBIC. The new text in line 3 is a good addition in my opinion, I see these comments in some of the other Defect types but not in this one good catch. I don't think the new text in line 5 is necessary, requiring a minimum radius seems to eliminate the need for the new text about square corners not being permitted, I think square corners are not possible if a minimum radius is required. It seems the full penetration requirement is covered in line 9. Is it possible to massage the rest of line 7 into line 11, I realize one is for preparation and one is for the final weld but the essence of the point seems to be the same. Ben Schaefer	Benjamin Schaefer
<u>Answer:</u>	
Nice work on this item. If we make changes to the current wording, then I think we should try to update the method to be consistent with ASME PCC-2. Please reference the attachment for my specific comments.	Matt Schaser
<u>Answer:</u>	
The terminology "square corner" seems to imply a 90-degree corner. What about a triangular patch. I think the requirement that all corners are radius does address all corners.	Raymond Spuhl
<u>Answer:</u>	
For 9) "The weld around a flush patch shall be a full penetration weld." Consider - A full penetration weld is required to join the flush patch to existing base metal.	Tom White
<u>Answer:</u>	

Comments received verbally during **January 2024** subgroup meeting from :

- Jonathan Ferreira
- George Galanes
- Matt Schaser
- Craig Hopkins

Comments received in **December 2023** (answers sent to all by email)

Comments / Propositions	Contact
I like the proposal. My only comment is with #3) "and laminations and shall be verified through nondestructive examination suitable for providing meaningful results (e.g. MT or PT)." If I am looking for laminations in plate I have a ultrasonic lamination scan performed. PT/MT can only detect on the edges and that is not a certainty.	Tom White Thomas.white@nrq.com +1 (281) 7824972
I suggest removing the NDE examples and let the repair organization suggest a suitable NDE and obtain the repair inspector concurrence: 3) Before installing a flush patch, defective material shall be removed until sound material is reached. The remaining material shall be free of corrosion and defects such as cracks and laminations and shall be verified through nondestructive examination suitable for providing meaningful results (e.g. MT or PT). The remaining material shall be measured to ensure it is at or above the required minimum thickness.	
<u>Answer:</u> Agree with leaving the repair organization suggest an NDE method.	
3) Before installing a flush patch, defective material shall be removed until sound material is reached. <u>The remaining material shall be free of corrosion and defects such as cracks and laminations and shall be verified through nondestructive examination suitable for providing meaningful results. The remaining material adjacent to the flush patch area shall be measured to ensure it is at or above the required minimum thickness.</u>	
Many good comments. Here's a few more: change end of first sentence in Item 3) (e.g. MT or PT to (e.g. MT, PT, UT-T) and recorded, to ensure its acceptance for subsequent flush patch installation. Delete its second sentence entirely. 7) change beginning of first sentence from The edges to The prepped areas. Change second sentence to After VT acceptance a suitable Nondestructive Examination (MT/PT) shall be performed for acceptance of all weld preparation areas of remaining surfaces and the flush patch.	Jamie Walker jwalker@hayesmechanical.com +1 (773) 9105892
<u>Answer:</u> I don't feel the need to add here that NDE results must be recorded to ensure acceptance of flush patch installation. NDE must be performed according to an NDE procedure that should address records, examiners...etc. We need to keep the second sentence. The requirement of measuring the thickness of the remaining material is what triggered this request of change. _	
3) Before installing a flush patch, defective material shall be removed until sound material is reached. <u>The remaining material shall be free of corrosion and defects such as cracks and laminations and shall be verified through nondestructive examination suitable for providing meaningful results. The remaining material adjacent to the flush patch area shall be measured to ensure it is at or above the required minimum thickness.</u>	
<u>Answer:</u> I agree that 7) needs some tweaking as suggest. My proposal would be:	
7) The edges <u>of the opening and patch shall be prepared for welding to ensure full penetration welds. After VT acceptance, a suitable nondestructive examination shall be performed for acceptance of all weld preparation areas before assembly and welding.</u>	
#7) I would recommend replacing "faces" with area. 7) The edges of the opening and patch shall be prepared for welding to ensure full penetration welds. A suitable nondestructive examination shall be used to examine the weld preparation area before assembly and welding.	Rick Valdez rvaldez@prim.com +1 (661) 3316024
<u>Answer:</u> I agree that 7) needs some tweaking as suggest. My proposal would be:	
7) The edges <u>of the opening and patch shall be prepared for welding to ensure full penetration welds. After VT acceptance, a suitable nondestructive examination shall be performed for acceptance of all weld preparation areas before assembly and welding.</u>	
There are a lot of good comments from others that need to be addressed. We probably should have sent this to Review and Comment instead of an up/down vote.	Robert Underwood robert_underwood@hsb.com +1 (618) 593.6231
<u>Answer:</u> Agree. Thank you. I answered Rob.	

<p>I agree with the comments provided by Rick and Tom, and I have the following additional comments: - In (3), we should clarify that the "nondestructive examination suitable for providing meaningful results" is surface NDE, which I believe will speak to Tom's comment. In addition, I believe additional instruction should be given in the last sentence regarding thickness measurement, specifically the quantity/representativeness of measurements and how far out they extend from the flush patch cut edge. You may also want to refer to 3.3.4.1, as revised by Action Item 23-40, which is adding language specifically about material thickness measurement after defect removal. - In (5), I believe the wording should not be restricted to just rectangular shapes or square corners; it should encompass all shapes which have edges of 90 degrees or greater. While it's not exactly likely that someone will try cutting a triangular flush patch, it is possible, and those corners should be rounded as well. - In (11), I believe this wording is quite vague and should be revised to state precisely what construction code requirements are to be met (i.e., welding procedure/performance qualification, welding documentation, etc.). For instance, the existing statement could easily be read as requiring a hydrostatic test for all flush patches, due to the construction code requiring such testing for all pressure boundary welds; I don't believe that's the intent of this statement, but it reads that way.</p>	<p>Andrew Triplett triplettal@ornl.gov +1 (865) 241.5969</p>
<p>Answer: I double checked item 23-40. The addition being discussed in 23-40 is <u>After the defect has been removed, the thickness of the remaining base material shall be measured to confirm thickness complies with the original Code of construction. Measurement results shall be documented.</u> See below new proposition. I believe that documentation of thickness measurements is a must and should be present in the NDE result that will be produced by the examiner after applying a thickness measuring technique. Item 23-41 includes in 2) a reference to 3.3.4.1 & 3.3.1 for the evaluation of defects.</p> <p>2) Defects should be evaluated in accordance with 3.3.1 & 3.3.4.1.</p> <p>3) Before installing a flush patch, defective material shall be removed until sound material is reached. The remaining material shall be free of corrosion and defects such as cracks and laminations and shall be verified through nondestructive examination suitable for providing meaningful results. The remaining material adjacent to the flush patch area shall be measured to ensure it is at or above the required minimum thickness as per the original Code of construction.</p> <p>Answer: We didn't work on item 5. We kept the original text as is. Agree with the suggestion and proposing to rearrange the text of 5):</p> <p>5) Patches may be any shape or size. If the patch is rectangular, Square corners are permitted. A minimum radius of not less than three times the material thickness shall be provided at the corners.</p> <p>Answer: We didn't work on item 11. We kept the original text as is. I don't agree with the comment. The various requirements to be complied with are stated in few other articles (welding documentation and qualification is addressed in section 2 of NBIC Part-3. Testing and examination is addressed in Section 4...etc.). A flush patch repair may require a hydrotest or alternative NDE. I suggest to leave 11) as is if possible.</p> <p>11) The completed welds shall meet the requirements of the original code of construction.</p>	
<p>Item 5, the term rectangular, seem very limiting. What if the patch is a triangle or a pentagon. Do the corners need to be radius? Item 7, why is an additional exam required of the weld preparation faces? The remaining material is already examined for defects in item 3.</p>	<p>Raymond Spuhl raymond_spuhl@hsb.com +1 (314) 223.6603</p>
<p>Answer: We didn't work on item 5. We kept the original text as is. Agree with the suggestion and proposing to rearrange the text of 5):</p> <p>5) Patches may be any shape or size. If the patch is rectangular, Square corners are permitted. A minimum radius of not less than three times the material thickness shall be provided at the corners.</p> <p>Answer: 7) is for weld preparation of the pressure retaining item and the patch. 3) is only for the defects removal in the area to be repaired.</p> <p>3) Before installing a flush patch, defective material shall be removed until sound material is reached. The remaining material shall be free of corrosion and defects such as cracks and laminations and shall be verified through nondestructive examination suitable for providing meaningful results. The remaining material adjacent to the flush patch area shall be measured to ensure it is at or above the required minimum thickness as per the original Code of construction.</p> <p>7) The edges of the opening and patch shall be prepared for welding to ensure full penetration welds. After VT acceptance, a suitable nondestructive examination shall be performed for acceptance of all weld preparation areas before assembly and welding.</p>	
<p>While I approve this change, had the fabricator followed these rules, the Loy-Lang vessel still would have failed due to the incompetence of the owner.</p>	<p>Walter Sperko sperko@asme.org +1 (336) 674-0600</p>
<p>Answer: Agree. Thank you. I answered M.Sperko</p>	
<p>Although I agree with Davis, Sperko, Walker and White; this item needs more work.</p>	<p>James Sekely jsekely@comcast.net +1 (412) 3895567</p>
<p>Answer: Agree. Thank you. I answered James.</p>	
<p>I agree this should have went to review and comment before a vote as there are many good comments that need to be addressed</p>	<p>Trevor Seime tsseime@nd.gov +1 (701) 220.4723</p>
<p>Answer: Agree. Thank you. I answered Trevor.</p>	
<p>In light of all the comments made as to changes needed I am abstaining</p>	<p>Michael Quisenberry michael@spartan-mech.com +1 (806) 316.7174</p>
<p>Answer: Agree. Thank you. I answered Michael.</p>	
<p>I like this in theory, but #7 is confusing to me. What exactly are we going to be asking of the stamp holder?</p>	<p>Kathy Moore kathymoore@joemoorecompany.com +1 (919) 8321665</p>
<p>Answer: I agree that we should look at 3 & 7 one more time and see if we can simplify both. My proposition?</p>	
<p>3) Before installing a flush patch, defective material shall be removed until sound material is reached. The remaining material shall be free of corrosion and defects such as cracks and laminations and shall be verified through nondestructive examination suitable for providing meaningful results. The remaining material shall be measured to ensure it is at or above the required minimum thickness as per the original Code of construction.</p> <p>7) The edges of the opening and patch shall be prepared for welding to ensure full penetration welds. After VT acceptance, a suitable nondestructive examination shall be performed for acceptance of all weld preparation areas before assembly and welding.</p>	
<p>Abstaining due to the posted comments as I believe they should be addressed.</p>	<p>Donald Kinney don.kinney@labor.nc.gov +1 (919) 707.7911</p>
<p>Answer: Agree. Thank you. I answered Donald</p>	
<p>Abstaining because of the comments made '</p>	<p>Frank Johnson fjkeck22@aol.com +1 (419) 386-8450</p>
<p>Answer: Agree. Thank you. I answered Frank.</p>	

While I like where we're trying to go with this change, I think the posted comments show that we need to do a lot more work on this proposal to reach consensus.	Steven Frazier steve.frazier@seattle.gov +1 (206) 684.8459
Answer: Agree. Thank you. I answered Steven.	
I agree with most of this. However, I will abstain as Action Item 23-39 has a proposal to revise 3.3.1 and I think that if 23-39 passes this may affect 23-41. I plan on presenting action item 23-39 during January's meeting.	Jonathan Ferreira jonathan_ferreira@hsb.com +1 (207) 745.6889
Answer: Thank you. Below is item 23-39. I believe it does give a general requirement of making sure making sure defects are dealt with. Item 23-41 brings more clarity and specific checks to be made when considering a patch. I think we can leave 23-41 as is for now and improve it possible in the future if we realize that overlapping does exist between articles 3.3.1 & 3.3.4.6.	
<p>3.3.1 Before a repair is made to a defect in a welded joint or base metal, care should be taken to investigate its cause and to determine its extent and likelihood of recurrence. When determining the repair plan for repairing a defect in a welded joint or base metal, a condition assessment to determine the cause, extent, and likelihood of recurrence of the defect is required depending on the complexity of the defect. The owner or user of the pressure-retaining item is responsible for the selection and application of the condition assessment methodology that is performed. When a condition assessment is performed, it shall be documented on the applicable R-form. Organizations or qualified individuals with experience in inspection, design, construction, repairs, or failure analysis of pressure-retaining items should be consulted to assist in identifying damage mechanisms and to evaluate the condition assessment results of the pressure-retaining item. NBIC Part 2, Section 4.4 should be used as a guide to aid in this assessment.</p> <p>When a condition assessment results in an increase in the inspection intervals of the pressure-retaining item, the owner or user shall notify the Jurisdiction, where required, of the new inspection interval and the new inspection intervals shall be documented on the applicable R-form. The owner/user has the responsibility to ensure that all items found during the condition assessment are addressed.</p>	
I Feel this needs more work before we can vote on it.	Louis Dutra ldutra@baycityboiler.com +1 (925) 3482881
Answer: Agree. Thank you. I answered Louis.	
From new item: "3) Before installing a flush patch, defective material shall be removed until sound material is reached. The remaining material shall be free of corrosion and defects such as cracks and laminations and shall be verified through nondestructive examination suitable for providing meaningful results (e.g. MT or PT). The remaining material shall be measured to ensure it is at or above the required minimum thickness". I believe you need to limit (or define extent of) the remaining material to an area around the patch. As it is written, one might assume the entire remaining pressure part has to be examined and must be free of the defects you list. Also, you may need to perform an appropriate volumetric type of examination instead of just surface / slight subsurface to find internal laminations.	Paul Davis pappy329@charter.net +1 (412) 3277420
<p>Answer: I agree. We removed the NDE examples and left NDE to be decided by the repair organization and the repair inspector as long as meaningful results can be obtained. For thickness measurements, the repair organization and the repair inspector will normally focus on the damaged areas or the pressure retaining item area that needs to be repaired (installation of a flush patch). An inspection normally already took place and articles such as 3.3.1 & 3.3.4.1 have been complied with. I don't think we can put a limitation on what areas of the pressure retaining items need thickness measurements. I know in my jurisdiction that when a pressure retaining item needs a flush patch, than it means it's not in a great shape and our repair inspector does indeed ask for thicknesses measurements in other areas to make sure the remaining parts of the vessel ae actually ok.</p> <p>3) Before installing a flush patch, defective material shall be removed until sound material is reached. The remaining material shall be free of corrosion and defects such as cracks and laminations and shall be verified through nondestructive examination suitable for providing meaningful results. The remaining material adjacent to the flush patch area shall be measured to ensure it is at or above the required minimum thickness as per the original Code of construction.</p>	



PROPOSED REVISION OR ADDITION

Item No. A23-77	
Subject/Title Combined Changes to NDE Requirements for Repairs and Alterations	
NBIC Location Part: Repairs and Alterations; Section: 4; Paragraph: 4.2.a thru 4.2.c, 4.4	
Project Manager and Task Group PM – Thomas White, A. Triplett, P. Miller, P. Lentzer, R. Collins, S. Frazier, J. Walker, P. Becker	
Source (Name/Email) Andrew Triplett / triplettal@ornl.gov	
Statement of Need 3 separate Action Items at January 2024 SG R&A sought to revise various portions of the same paragraphs in Part 3, Section 4 (Items A23-36, A23-59, and A23-77). These Items failed to account for newly approved wording from Action Item A23-04, which received Main Committee approval and is going into the 2025 NBIC. Instead of proceeding with these different Items, they have been incorporated into a single Item with the approved 2025 wording, while modifying the format of these paragraphs slightly. Screenshots of the originally-proposed changes in A23-36, A23-59, and A23-77 are at the end of this document.	
Background Information At the January 2024 SG R&A meeting, it was proposed that instead of proceeding with 3 separate Action Items seeking to revise the same paragraphs in Part 3, Section 4, it would be best to consolidate these into a single Item for this purpose, allowing for much easier integration into the NBIC and the newly approved language from A23-04.	
Existing Text (2023 Edition, A23-04) 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, standard, or specification selected for the repair or alteration of the pressure-retaining item (see NBIC Part 3, 1.2). 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. Where the welds were subject to volumetric NDE during construction, repairs may be made to the base material and weld joints without volumetric examination under the following conditions: 1. The repair depth does not exceed the lesser of 1/8 inch (3 mm) or 25% of the nominal base material thickness. 2. The aggregate repair length is no longer than 6 inches (150 mm). 3. The repair cavity and each layer of deposited weld, including the final weld surface, have been examined by MT or PT.	Proposed Text (2023 Edition, A23-36, A23-59, A23-77) 4.2 NONDESTRUCTIVE EXAMINATION a) Nondestructive examination (NDE) requirements, except for NDE personnel qualification requirements, including technique, extent of coverage, procedures, personnel qualification, and acceptance criteria, shall be in accordance with the original code of construction, standard, or specification selected for the repair or alteration of the pressure-retaining item (see NBIC Part 3, 1.2). Where this is not possible or practicable, or where there is not enough information available to determine the original NDE requirements, alternative NDE methods that provide meaningful results to verify the integrity of the repair or alteration may be used provided acceptable to the Inspector and, if required, the Jurisdiction where the pressure-retaining item is installed, where required, may be used accept the alternative NDE methods, and all other requirements of this section are met. (a)(1) Where the welds were subject to volumetric NDE during construction, repairs may be made to the base material and weld joints without volumetric examination— under provided all the following conditions are met: a. 1. —The repair depth does not exceed the lesser of 1/8 inch (3 mm) or 25% of the nominal base material thickness. b. 2. —The aggregate repair length is no longer than 6 inches (150 mm). c. 3. —The repair cavity and each layer of deposited weld, including the final weld surface, have been examined using by the magnetic particle (MT) or liquid penetrant (PT) method.



b) When volumetric NDE is required by the original code of construction but is not possible or practicable, progressive liquid penetrant or magnetic particle examination as described in paragraph 4.2 (b)(1) may be used. This alternative NDE method is subject to the acceptance of the Inspector, owner and when required, the Jurisdiction where the pressure-retaining item is installed, provided that all other requirements of this section are met.

1) Progressive liquid penetrant or magnetic particle examination shall be performed on each layer of the weld to be examined, including the final weld. Prior to performing PT or MT the surface of each layer of weld shall be properly prepared for examination. The final weld may be examined with or without grinding. The NDE report shall include the number of layers examined. This alternative NDE method shall be documented on the applicable R-form in the remarks section.

c) NDE personnel shall be qualified and certified in accordance with the requirements of the original code of construction. When this is not possible or practicable, NDE personnel may be qualified and certified in accordance with their employer's written practice. ASNT SNT-TC-1A, *Recommended Practice Nondestructive Testing Personnel Qualification and Certification* (2006 edition), or ANSI/ASNT CP-189, *Standard for Qualification and Certification of Nondestructive Testing Personnel* (2006 edition), shall be used as a guideline for employers to establish their written practice. Provisions for training, experience, qualification, and certification of NDE personnel shall be described in the "R" Certificate Holder's written quality system.

4.4 EXAMINATION AND TEST FOR REPAIRS AND ALTERATIONS

The following requirements shall apply to all repairs and alterations to pressure-retaining items:

- a) The integrity of repairs, alterations, and replacement parts used in repairs and alterations shall be verified by examination or test;
- b) Testing methods used shall be suitable for providing meaningful results to verify the integrity of the repair or alteration. Any insulation, coatings, or coverings that may inhibit or compromise a meaningful test method shall be removed, to the extent identified by the Inspector;
- c) The "R" Certificate Holder is responsible for all activities relating to examination and test of repairs and alterations;
- d) Examinations and tests to be used shall be subject to acceptance of the Inspector and, where required, acceptance of the Jurisdiction.

~~(a)(2b) Where the welds were subject to volumetric NDE during construction, when volumetric NDE is required by the original code of construction, but volumetric examination is no longer not possible or practicable, progressive liquid penetrant -PT or magnetic particle MT-MT examination as described in paragraph 4.2 (b)(1) or 4.2 (b)(2) may be used in lieu of volumetric NDE, provided all the following conditions are met:~~

~~a. This alternative NDE method is subject to the acceptance of The the Inspector, owner and if when required, the Jurisdiction where the pressure-retaining item is installed, have accepted the use of this alternative NDE method. provided that all other requirements of this section are met.~~

~~b. Progressive PT liquid penetrant or MT magnetic particle examination shall be performed on each layer of the weld to be examined, including the final weld.~~

~~c. Prior to performing PT or MT the surface of each layer of weld shall be properly prepared for examination, except that the. The final weld may be examined with or without grinding.~~

~~d. The NDE report shall include the number of layers examined.~~

~~e. This alternative NDE method shall be documented on the applicable R-form in the remarks section.~~

~~This alternative NDE method is subject to the acceptance of the Inspector, owner and when required, the Jurisdiction where the pressure retaining item is installed, provided that all other requirements of this section are met.—~~

~~1) If volumetric NDE is not possible or practicable, Liquid penetrant P progressive PT or magnetic particle MT examination shall may be performed on each layer of deposited weld, the weld to be examined including the final weld. Prior to performing PT or MT, the surface of each layer of weld shall be properly prepared for examination, except that the. The final weld may be examined with or without grinding. The NDE report shall include the number of layers examined. This alternative NDE method shall be documented on the applicable R form in the remarks section, and is subject to the acceptance of the Inspector, owner and if required, the Jurisdiction where the pressure-retaining item is installed.~~

~~2) If repair depth does not exceed the lesser of 1/8 inch (3 mm) or 25% of the nominal base material thickness, and aggregate repair length is no longer than 6 inches (150 mm), progressive PT or MT examination may be performed on the repair cavity and each layer of deposited weld, including the final weld.~~

~~(e) e) NDE personnel shall be qualified and certified in accordance with the requirements of the original code of construction, standard, or specification selected for the repair or alteration of the pressure-retaining item (see NBIC Part 3, 1.2). When this is not possible or practicable, NDE personnel may be qualified and certified in accordance with their employer's written practice. ASNT SNT-TC-1A, *Recommended Practice Nondestructive Testing Personnel Qualification and Certification* (2006 edition), or ANSI/ASNT CP-189, *Standard for Qualification and Certification of Nondestructive Testing Personnel* (2006 edition), shall be used as a guideline for employers to establish their written practice. Provisions for training, experience, qualification, and certification of NDE personnel shall be described in the "R" Certificate Holder's written quality system.~~



A23-36 PROPOSED CHANGES to 2023 NBIC; Part 3:

4.2 NONDESTRUCTIVE EXAMINATION

a) 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, standard, or specification selected for the repair or alteration of the pressure-retaining item (see NBIC Part 3, 1.2). 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 that provide meaningful results to verify the integrity of the repair or alteration may be used provided acceptable to the Inspector, and if required, the Jurisdiction where the pressure-retaining item is installed, where required, accept the alternative NDE method(s) may be used, provided that and all other requirements of this section are met.**

Where the welds were subject to volumetric NDE during construction, repairs may be made to the base material and weld joints without volumetric examination **under provided all the following conditions are met:**

- 1) The repair depth does not exceed the lesser of 1/8 inch (3 mm) or 25% of the nominal base material thickness;
- 2) The aggregate repair length is no longer than 6 inches (150 mm);
- 3) The repair cavity and each layer of deposited weld, including the final weld surface, have been examined by MT or PT.

b) NDE personnel shall be qualified and certified in accordance with the requirements of the original code of construction. When this is not possible or practicable, NDE personnel may be qualified and certified in accordance with their employer's written practice. ASNT SNT-TC-1A, Recommended Practice Nondestructive Testing Personnel Qualification and Certification (2006 edition), or ANSI/ASNT CP-189, Standard for Qualification and Certification of Nondestructive Testing Personnel (2006 edition), shall be used as a guideline for employers to establish their written practice. Provisions for training, experience, qualification, and certification of NDE personnel shall be described in the "R" Certificate Holder's written quality system.

4.4 EXAMINATION AND TEST FOR REPAIRS AND ALTERATIONS

The following requirements shall apply to all repairs and alterations to pressure-retaining items:

- a) The integrity of repairs, ~~alterations,~~ and replacement parts used in repairs ~~and alterations~~ shall be verified by examination or test; **in accordance with 4.4.1**
- b) The integrity of ~~repairs,~~ alterations, and replacement parts used in ~~repairs and~~ alterations shall be verified by examination or test; **in accordance with 4.4.2**
- ~~b)c) Examination or~~ testing methods used shall be suitable for providing meaningful results to verify the integrity of the repair or alteration. Any **impediment that compromises or limits a test method, such as insulation, coatings, oxidation, or coverings that may inhibit or compromise a meaningful test method shall be removed,** to the extent **acceptable to the Inspector;**
- ~~d) The "R" Certificate Holder is responsible for all activities relating to examination and test of repairs and alterations;~~
- ~~e) Examinations and tests to be used shall be subject to acceptance of the Inspector and, where required, acceptance of the Jurisdiction.~~



A23-59 proposed changes

4.2 NONDESTRUCTIVE EXAMINATION

a) Nondestructive examination (NDE) requirements, **except for NDE personnel qualification requirements**, including ~~technique, extent of coverage, procedures, personnel qualification, and acceptance criteria~~, shall be in accordance with the original code of construction, standard, or specification selected for the repair or alteration of the pressure-retaining item (see NBIC Part 3, 1.2). 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, provided that all other requirements of this section are met.

Where the welds were subject to volumetric NDE during construction, repairs may be made to the base material and weld joints without volumetric examination under the following conditions:

- 1) The repair depth does not exceed the lesser of 1/8 inch (3 mm) or 25% of the nominal base material thickness;
- 2) The aggregate repair length is no longer than 6 inches (150 mm);
- 3) The repair cavity and each layer of deposited weld, including the final weld surface, have been examined by MT or PT.

b) NDE personnel shall be qualified and certified in accordance with the requirements of the original code of construction, **standard, or specification selected for the repair or alteration of the pressure-retaining item (see NBIC Part 3, 1.2)**. When this is not possible or practicable, NDE personnel may be qualified and certified in accordance with their employer's written practice. ASNT SNT-TC-1A, *Recommended Practice Nondestructive Testing Personnel Qualification and Certification* (2008 edition), or ANSI/ASNT CP-189, *Standard for Qualification and Certification of Nondestructive Testing Personnel* (2006 edition), shall be used as a guideline for employers to establish their written practice. Provisions for training, experience, qualification, and certification of NDE personnel shall be described in the "R" Certificate Holder's written quality system.

A23-77 Proposed Text

4.2 NONDESTRUCTIVE EXAMINATION

a) 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, standard, or specification selected for the repair or alteration of the pressure-retaining item (see NBIC Part 3, 1.2). Weld repairs and alterations shall be subjected to the same ~~nondestructive examination~~ NDE requirements as the original welds; **all available documentation from original construction should be used to aid in determining these NDE requirements**. Where this is not possible or practicable, **or where there is not enough information available to determine the original NDE**, alternative NDE methods acceptable to the Inspector and the Jurisdiction where the pressure-retaining item is installed, **if** required, may be used; provided that all other requirements of this section are met.

SUPPLEMENT 8**WELD AND POST REPAIR INSPECTION OF CREEP STRENGTH ENHANCED FERRITIC STEEL PRESSURE EQUIPMENT****S8.1 SCOPE**

(23)

- a) The technical information provided in this supplement pertains to weld repair and post repair inspection of creep strength enhanced ferritic steel (CSEF) pressure retaining items. The present guidance covers P-No. 15E, Group 1, Grade 91 and dissimilar welds made to this material (e.g. P-No. 4, P-No. 5A or P-No. 8, P-No. 42, P-No. 43 or P-No. 45). This Supplement provides guidance for full penetration and partial penetration weld repairs not covered under Welding Method 6 (NBIC Part 3, 2.5.3.6) or Welding Method 7 (NBIC Part 3, 2.5.3.7).
- b) Creep Strength Enhanced Ferritic alloys (CSEFs) are a collection of ferritic steels whose creep strength is enhanced by the creation of a precise condition of micro-structure, specifically martensite or bainite, which is stabilized during tempering by controlled precipitation of temper-resistant carbides, carbo-nitrides, or other stable and/or meta-stable phases. Careful consideration shall be given to pressure-retaining items that are fabricated from CSEF steels. The behavior of these materials in low temperature (i.e. fracture toughness and/or fatigue) and in high temperature (i.e. creep and/or creep-fatigue) components can be degraded by not adhering to the welding procedures and/or improper application of post-weld heat treatment (PWHT). Experienced inspection personnel should oversee weld repairs of this nature for strict compliance with all welding procedure and repair requirements.
- c) Post construction access and in-service operation may not allow the practicable application of PWHT following original construction fabrication requirements and repair weld joint design. This supplement provides guidelines for weld repair options and post repair inspection using a well-engineered approach for CSEF steels. The user is cautioned to seek technical guidance for welding and selection of heat treating requirements.
- d) Prior to using this guideline an engineering evaluation shall be performed to determine the scope of the repair and impact to safety prior to returning the pressure-retaining item to service for a specified period of time, based on acceptance by the Inspector, and when required the Jurisdiction. The organization performing the engineering evaluation shall have demonstrated experience with Grade 91 CSEF steels.

S8.2 WELD REPAIR OF GRADE 91 STEEL**S8.2.1 WELD REPAIR OPTIONS**

(23)

- a) 9Cr-1Mo-VNbN Filler Metal (i.e. matching to Grade 91) + Controlled Fill + Low PWHT (Minimum temperature is 1250°F, 675°C). Acceptable filler materials are referenced in Table S8.2.1. The minimum time and maximum heat treatment temperature shall be in accordance with the original code of construction. For reference, where the Ni+Mn content of the filler metal is not known, the maximum PWHT temperature shall be 1425°F (775°C). This maximum shall be enforced to avoid over-tempering or exceeding the absolute maximum PWHT temperature. PWHT hold times at temperature shall be as follows:
- 1) Minimum holding time at PWHT temperature is specified as 1 hour per 1.0 inch (25 mm) of thickness, 30 minute minimum provided the component < 0.5 inches (12.5 mm) in thickness; and
 - 2) Minimum holding time at PWHT temperature is specified as 5 hours plus 15 minutes for each additional 1.0 inch (25 mm) over 5.0 inches (125 mm).
- b) 9Cr-1Mo Filler Metal + Controlled Fill and No PWHT. Acceptable filler materials are detailed in Table S8.2.1.

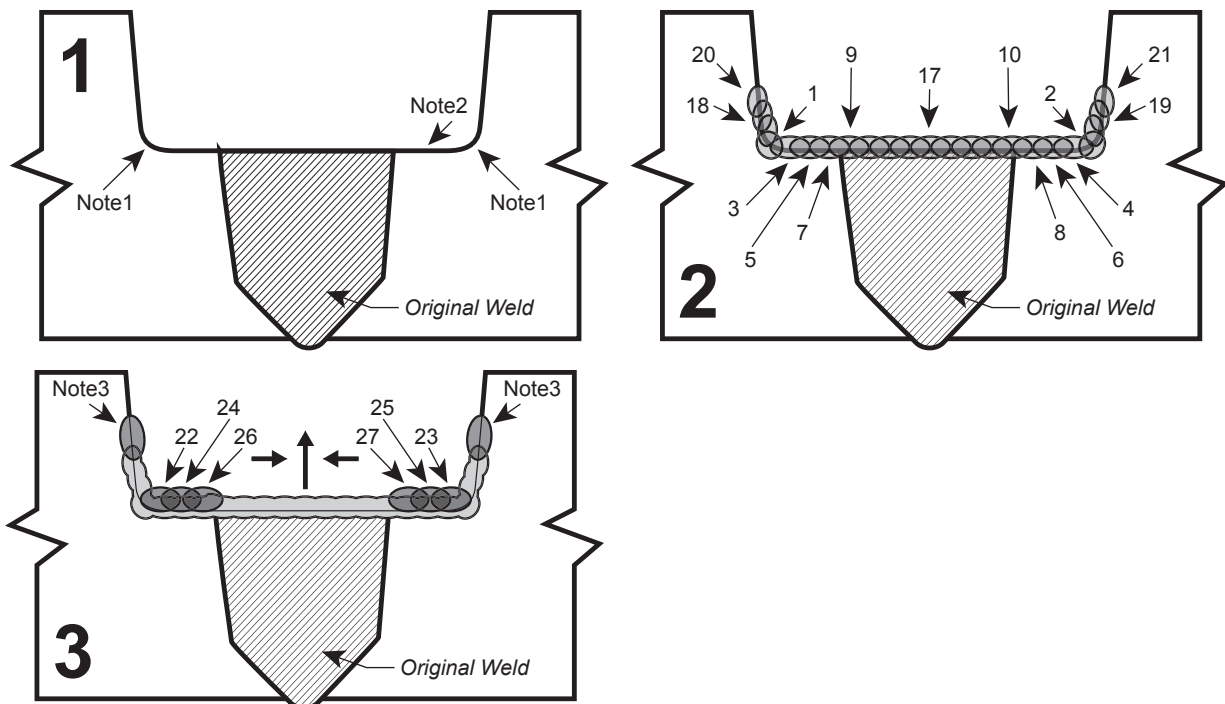
- b) To control heat input the weld repair shall be performed using a “controlled fill” technique. In this technique, the first layer in contact with the repair groove can be identical or smaller in diameter than the fill passes.
- c) Figures S8.3-a through S8.3-d illustrate the ~~types of acceptable weld joint details~~ using the controlled fill technique for full or partial penetration weld repairs.
- d) The fill passes should be deposited working from the bevel of the excavation towards the center of the excavation with a minimum overlap of 25% and ideally 50%. As a rule of thumb, if the welder aims for the toe of the previously deposited weld bead, an overlap of at least 40% will be achieved.
- e) When the SMAW process is specified, the weld beads deposited onto the base material shall not exceed an electrode diameter of 1/8 in. (3.2 mm). The remaining fill passes shall not exceed an electrode diameter of 5/32 in. (4.0 mm). When the GTAW process is specified, any limits for filler metal size shall be reflected in the qualified PQR and WPS.

deposition
of weld
passes

This
supplement
is not
restricted
to the repair
of girth welds.

FIGURE S8.3-a.

SCHEMATIC OF THE CONTROLLED FILL WELDING PROCEDURE FOR GRADE 91 STEEL FOR A PARTIAL PENETRATION WELD REPAIR.



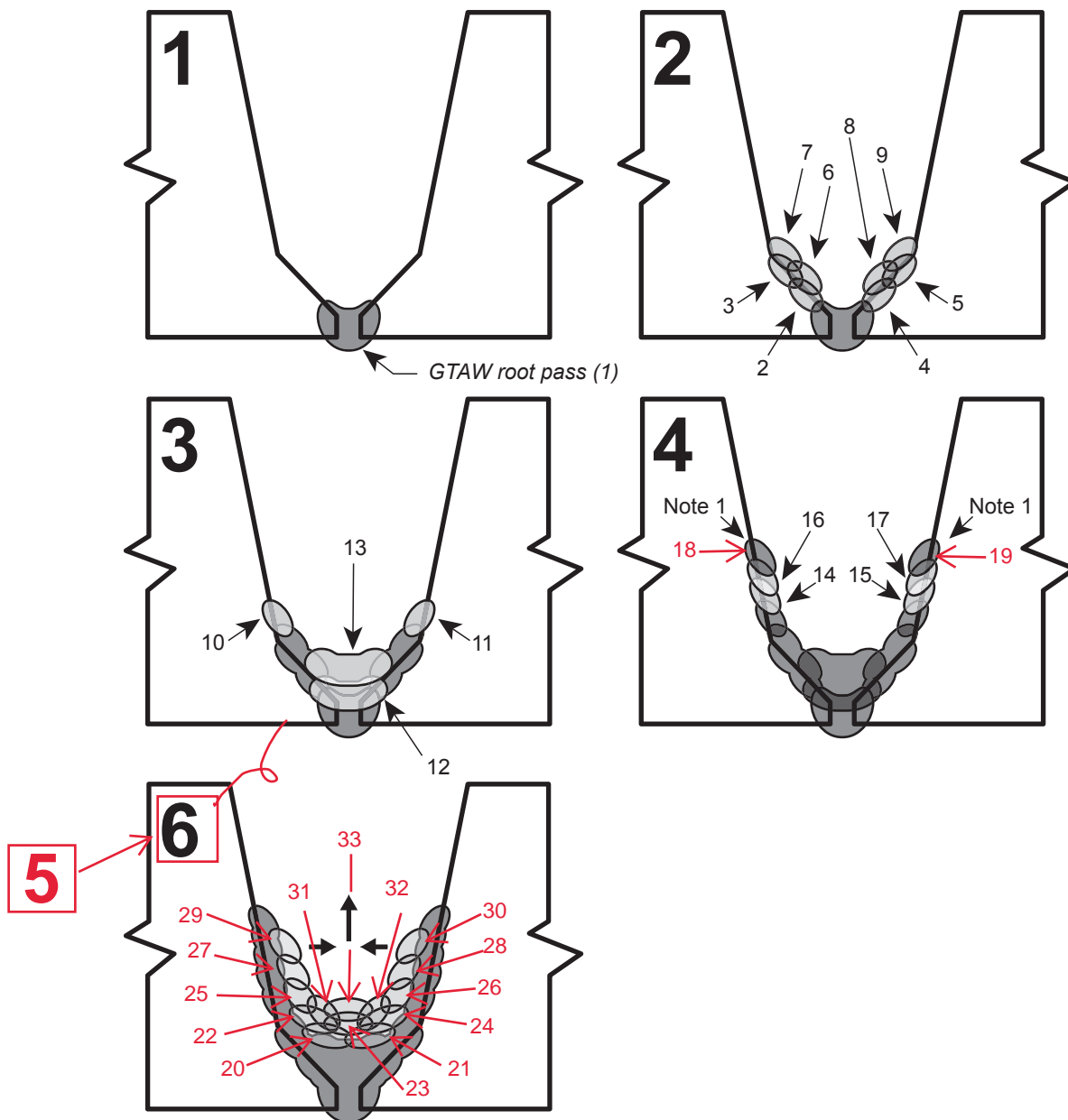
Note 1 – The excavation shall have rounded corners to prevent lack of fusion defects. In these locations it is recommended to use a smaller diameter electrode (such as 3/32 in. (2.4 mm)) to ensure acceptable fusion.

Note 2 – The repair cavity width shall extend at least 0.40 in. (10 mm) beyond the fusion line of the original weld

Note 3 – Where the excavation may pose challenges with electrode access, it is recommended that the fill passes in immediate contact with the machined excavation be restricted in height as the weld repair is performed.

FIGURE S8.3-b.

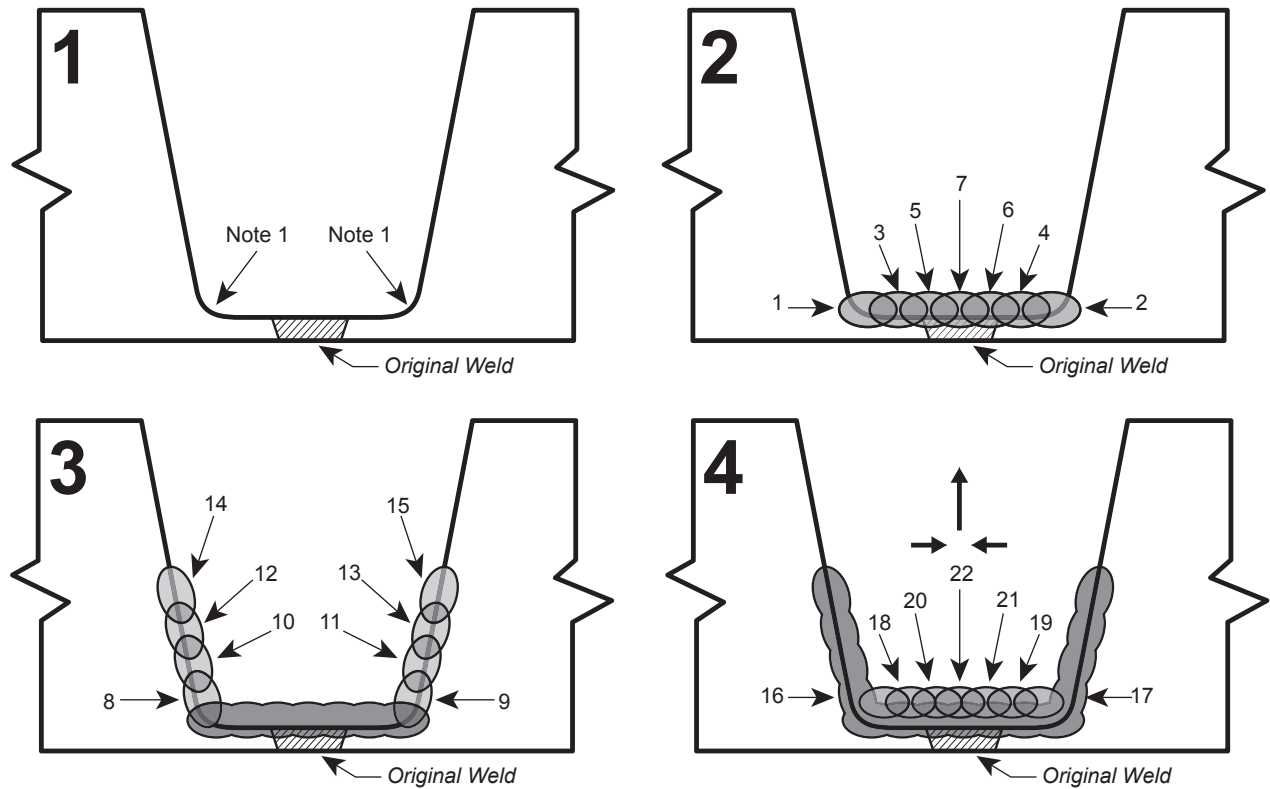
SCHMATIC OF THE CONTROLLED FILL WELDING PROCEDURE FOR GRADE 91 STEEL FOR A FULL PENETRATION WELD REPAIR USING A COMPOUND BEVEL.



Note 1 – Where the excavation may pose challenges with electrode access, it is recommended that the fill passes in immediate contact with the machined excavation be restricted in height as the weld repair is performed.

FIGURE S8.3-c.

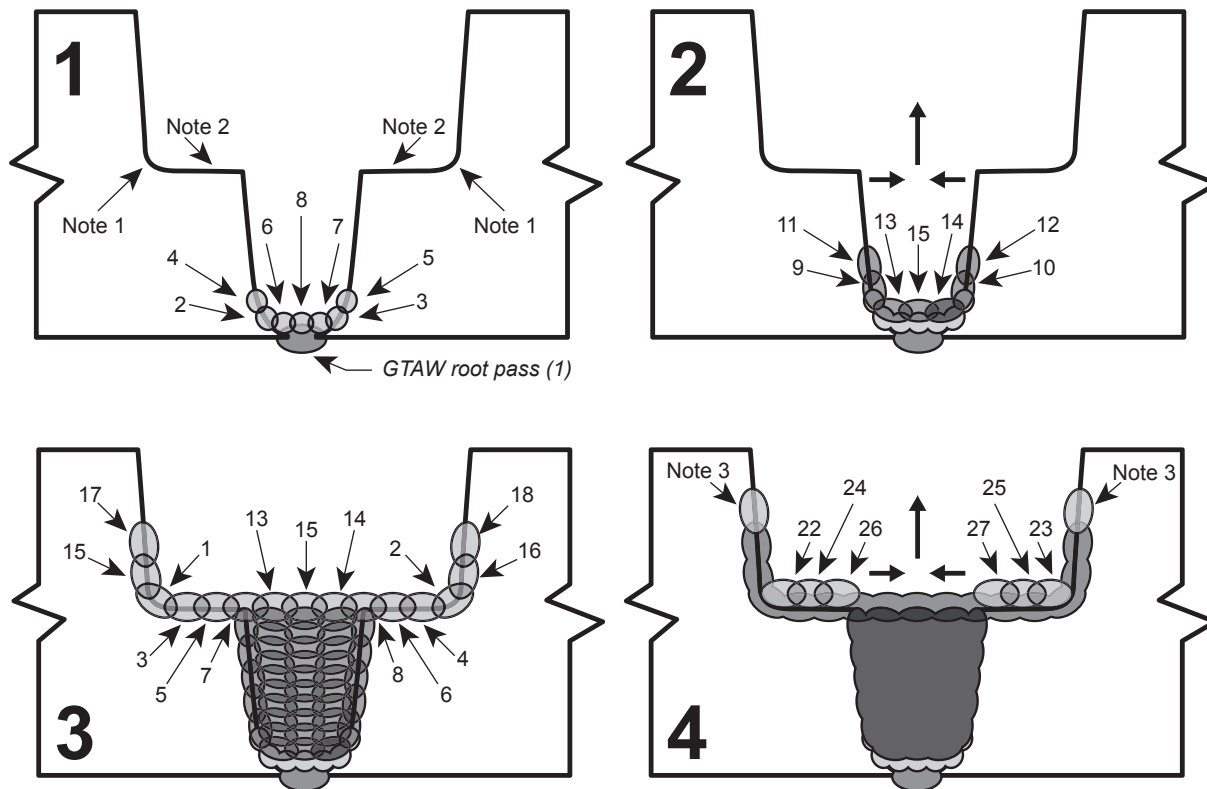
SCHMATIC OF THE CONTROLLED FILL WELDING PROCEDURE FOR GRADE 91 STEEL FOR FULL PENETRATION WELD REPAIR USING A LAND.



Note 1 – The excavation shall have rounded corners to prevent lack of fusion defects. In these locations it is recommended to use a smaller diameter electrode (such as 3/32 in.(2.4 mm)) to ensure acceptable fusion.

FIGURE S8.3-d.

SCHMATIC OF THE CONTROLLED FILL WELDING PROCEDURE FOR GRADE 91 STEEL FOR A FULL PENETRATION WELD REPAIR USING A STEP WELD PREPARATION.



Note 1 – The excavation shall have rounded corners to prevent lack of fusion defects. In these locations it is recommended to use a smaller diameter electrode (such as 3/32 in. (2.4 mm)) to ensure acceptable fusion.

Note 2 – The repair cavity width shall extend at least 0.40 in. (10 mm) beyond the fusion line of the original weld

Note 3 – Where the excavation may pose challenges with electrode access, it is recommended that the fill passes in immediate contact with the machined excavation be restricted in height as the weld repair is performed.

(23) S8.4 QUALIFICATION OF CONTROLLED FILL WELDING PROCEDURE

- The welding procedure qualification test coupon shall be ASME P-No. 15 E, Group 1, Grade 91 joined to itself, P-No. 4, P-No. 5A, P-No. 8, P-No. 42, P-No. 43, or P-No. 45.
- Qualification thickness for the test plates and repair groove depths shall be in accordance with ASME Section IX.
- The Welding Procedure Specification (WPS) shall be qualified in accordance with requirements of ASME Section IX.
- For qualification of weld repair procedures using 9Cr-1Mo filler metal and in the as-welded condition, the requirements for the bend test shall be performed using a bend radius which achieves a minimum of 14% elongation in the outer fibers.

S8.5 POST REPAIR INSPECTION

- a) 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.
- b) Post-repair inspection intervals and methods of examination shall be implemented to ensure safe operation and margin to locate and monitor defect growth in the weld repair area. The selected non-destructive examination method shall provide meaningful results and shall follow NBIC Part 3, Section 4.
- c) Post repair inspection shall be ongoing until the component reaches end of life or is replaced. The Owner/User may revise the re-inspection interval based on inspection results from previous inspections.

Item 23-83

This item proposes to **relocate** three **existing** repair methods and two existing alteration methods to a new Engineered Repairs and Alterations Supplement which was approved by the Main Committee last August.

Note: These are existing activities in the main body of Part 3 and will not, at this time, require an “Advanced Scope/Certificate” issued by the National Board. The “Advanced Scope/Certificate” will be addressed after the 2025 Edition is published. Additionally, these paragraphs have not been modified except for needed references to other relevant parts of Part 3.

The following paragraphs have been relocated to this proposed supplement:

<p>3.3.4.3 WASTED AREAS</p> <p>e) External Weld Metal Buildup</p> <p><i>All text in 3.3.4.3(e), including Figure 3.3.4.3-c, will be relocated to paragraph SXX.2.1 of the new Engineered Repairs and Alteration Supplement as indicated on page 2 of this proposal.</i></p>
<p>3.3.4.8 REPAIR OF PRESSURE-RETAINING ITEMS WITHOUT COMPLETE REMOVAL OF DEFECTS</p> <p><i>All text in 3.3.4.8 will be relocated to paragraph SXX.2.2 of the new Engineered Repairs and Alteration Supplement as indicated on page 2 of this proposal.</i></p>
<p>3.3.5 REPAIR OF ASME SECTION VIII< DIVISION 2 OR 3, PRESSURE VESSELS</p> <p><i>All text in 3.3.5 will be relocated to paragraph SXX.2.3 of the new Engineered Repairs and Alteration Supplement as indicated on page 2 of this proposal.</i></p>
<p>3.4.3 ENCAPSULATION</p> <p><i>All text in 3.4.3 will be relocated to paragraph SXX.3.1 of the new Engineered Repairs and Alteration Supplement as indicated on page 2 of this proposal.</i></p>
<p>3.4.5 ALTERATION OF ASME CODE SECTION VIII, DIVISION 2 OR 3, PRESSURE VESSELS</p> <p><i>All text in 3.4.5 will be relocated to paragraph SXX.3.2 of the new Engineered Repairs and Alteration Supplement as indicated on page 2 of this proposal.</i></p>

SUPPLEMENT XX – ENGINEERED REPAIRS AND ALTERATIONS

SXX.1 SCOPE

- a) This supplement provides requirements and guidelines for engineered repairs and alterations to pressure retaining items. These requirements shall be used in conjunction with the applicable rules of the main Parts of the NBIC.

SXX.2 Engineered Repair Methods

SXX.2.1 EXTERNAL WELD METAL BUILDUP

- a) Pressure-retaining items that have localized internal thinning due to erosion and/or corrosion and where the internal surface is not readily accessible may be weld repaired by depositing weld metal on the external surface of the item as shown in NBIC Part 3, Figure SXX.2.1-a. This method of repair is subject to approval by the Inspector and the Jurisdiction, where required.
- b) All of the following conditions shall apply for this repair method to be permitted:
- 1) The component to be repaired shall be a ferrous material;
 - 2) The maximum design temperature of the repaired component shall not exceed 650°F (340°C), and the minimum design temperature shall not be less than -20°F (-29°C);
 - 3) The pressure-retaining item shall be volumetrically examined for cracks in the area to be weld repaired. If cracks are detected, this repair method shall NOT be used;
 - 4) The WPS followed shall be qualified for weld metal buildup in accordance with ASME Section IX. The nominal chemical analysis of the deposited weld metal shall be equivalent to the base material that is to be repaired. In addition, the nominal tensile strength of the deposited weld metal shall be equal to or exceed the specified minimum tensile strength and shall be based on the requirements of the welding consumable. If butt welds in the component being overlaid required postweld heat treatment by the code of construction, the WPS followed for the weld buildup shall be qualified with PWHT;
 - 5) The pressure-retaining item shall be taken out of service prior to performing the weld metal buildup. The owner of the pressure-retaining item shall evaluate the flammability, volatility, or potential reaction of the contents that were in the vessel to ensure safe working conditions during weld repair. When required by the results of this evaluation, the pressure-retaining item shall be drained of its contents to the extent necessary to make the repair;
 - 6) This method may be used more than once in the same areas to repair locally thinned areas; however, the cumulative weld buildup for all repairs shall not exceed the thickness (t) of the component at any point; and
 - 7) Repairs using this method shall not cover more than 25% of the circumference of the component.
- c) External weld buildup shall be applied in accordance with the following requirements:
- 1) The area to be repaired shall be ultrasonically scanned for wall thickness, and the location and size of the thinned region shall be mapped;
 - 2) The area requiring repairs and the boundaries of the weld buildup shall be marked on the external surface of the component;

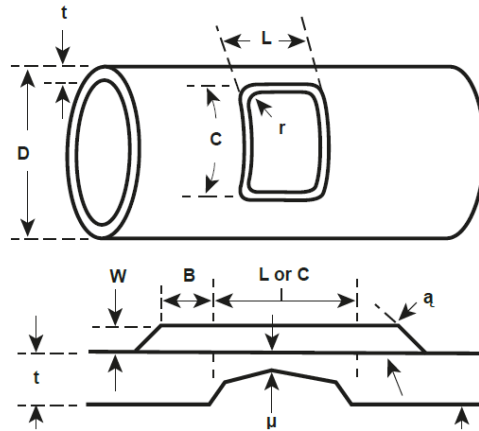
- 3) The general design of the external weld buildup shall be in accordance with NBIC Part 3, Figure [SXX.2.1-a](#). The finished weld buildup shall be circular, oval, or rectangular in shape;
- 4) The weld buildup shall extend, at full thickness, a minimum distance B in each direction beyond the boundaries of the thinned base metal area.
 - a. $B = 3/4 \sqrt{(Rt_{nom})}$
 - b. R = outer radius of the component, or D/2
 - c. t_{nom} = nominal wall thickness of the component

The thickness shall be sufficient to maintain the predicted life of the repair. Any corrosion allowance that is determined to be necessary shall be added to the value of B.

- 5) All edges of the weld buildup shall be tapered to the existing contour of the component, at a maximum angle (a) of 45°;
- 6) The thickness of the weld buildup shall be uniform except along tapered edges as welded surfaces are acceptable, provided they are free of coarse ridges and valleys and are suitable for any required nondestructive examinations;
- 7) All corners of the weld buildup shall have a minimum radius (r), not less than the overlay thickness;
- 8) Any corrosion allowance that is determined to be necessary shall be added to the thickness of the weld buildup;
- 9) The thickness (W) of the weld deposit plus the remaining wall thickness in the affected area (μ) of the component at its thinnest point shall not exceed the nominal wall thickness (t) of the component. This shall be verified by ultrasonic methods;
- 10) Final dimension and contour of the weld buildup may be achieved by grinding or machining. This work may be done before or after any PWHT;
- 11) The weld buildup shall be examined by liquid penetrant inspection or wet fluorescent magnetic particle inspection. If the butt welds in the component being built up were required to be volumetrically examined during the original construction, the built-up area shall be similarly volumetrically examined;
- 12) For each repair, the maximum dimension (L, length along axis) compensated by a circular or oval weld buildup shall not exceed the lesser of 1/4 the nominal outside diameter or the component or 8 in. (200 mm). The length of a rectangular patch is not limited; and
- 13) The distance between the weld toes of the multiple weld buildup regions on a component's outer diameter surface area shall not be less than $3/4 \sqrt{(Rt)}$.
- 14) [Test and examination methods shall be in accordance with Part 3, Section 4.](#)
- 15) [Documentation and distribution requirements shall be in accordance with Part 3, Section 5.](#)

FIGURE [SXX.2.1-a](#)

EXTERNAL OVERLAY TERMS AND DEFINITIONS



L = length of area to be repaired along the axis of the component

C = length of area to be repaired along outside circumference of the component

W = the completed thickness of the overlay

α = the angle between the component and the overlay (maximum 45°)

$B = 3/4 (Rt)^{0.5}$ minimum

R = nominal outside radius of the component

D = the nominal outside diameter of the component

t = nominal wall thickness of the component

μ = remaining wall thickness of the component shall be 1/16 in. (1.6 mm) or greater

r = minimum radius, not less than the overlay thickness

SXX.2.2 REPAIR OF PRESSURE-RETAINING ITEMS WITHOUT THE COMPLETE REMOVAL OF DEFECTS

- a) There may be cases where removal of a defect in a pressure-retaining item is not practical at the time the defect is found. In such cases, with approval of the Inspector and, when required, the Jurisdiction, an engineering evaluation shall be performed to determine the scope of the repair and impact to safety prior to returning the pressure-retaining item to service for a specified period of time. The engineering evaluation shall be performed by an organization with demonstrated competency in defect (and flaw) characterization of pressure-retaining items. The method of defect evaluation and time interval for returning the pressure-retaining item back to service shall be as agreed upon by the Inspector, and when required, the Jurisdiction. The specified period of time the defect can remain in service after weld repair shall be based on no measurable defect growth during subsequent inspections, or a period of time as specified by the Jurisdiction, if applicable. This repair method is not permitted for vessels used in lethal service, vessels designed for high-cycle operation or fatigue service, compressed air storage, and in cases where high stress concentration cannot be reduced by weld repair. This repair method is not permitted for DOT vessels.
- b) One or more fitness-for-service engineering evaluation methods as described in NBIC Part 2, 4.4 shall be used to determine whether the defect may remain, either in part or in whole, in the pressure-retaining item. If it is determined that the defect can remain in the item, a risk-based inspection program shall be developed as described in NBIC Part 2, 4.5 to assure inspection of the defect and monitoring of defect growth over time. This program shall be a controlled and documented inspection program that specifies inspection intervals as agreed upon with the Inspector and, when required, the Jurisdiction, and shall be maintained until the defect can be completely removed and the item repaired.
- c) The following requirements shall apply to the weld repair of pressure-retaining items without complete removal of defects:
 - 1) Engineering evaluation of the defect in the pressure-retaining item shall be conducted using one or more fitness-for-service condition assessment method(s) as described in NBIC Part 2, 4.4. Engineering evaluation of the condition assessment results shall be performed by an organization

that has demonstrated industry experience in evaluating pressure-retaining items, if the fitness-for-service engineering evaluation requires finite element analysis (FEA), the requirements in NBIC Part 2, 4.6 and NBIC Part 2, Supplement 11 shall be met.

- 2) If engineering evaluation indicates a defect can remain in the pressure-retaining item, a risk-based inspection program shall be developed and implemented based on review and acceptance by the Inspector and, when required, the Jurisdiction. The risk-based inspection program shall be in accordance with the requirements in NBIC, Part 2, 4.4.
- 3) The fitness-for-service condition assessment and risk-based inspection programs shall remain in effect for the pressure-retaining item until such time that the defect can be completely removed and the item repaired. The fitness-for-service condition assessment method, results of assessment, and method of weld repair, if applicable, shall be documented on a Report of Fitness for Service Assessment (FFSA) Form as described in NBIC Part 2, 4.4.1 and shall be filed with the Jurisdiction, when required.
- 4) When weld repairs are performed without complete removal of the defect(s), this shall be noted on the Form R-1 in the description of the work. The "R" Stamp Holder performing the weld repairs shall provide detailed information on the Form R-1, describing the method, extent, and include the specific location of the weld repair on the item.
- 5) The interval to re-inspect or remove the item from service or perform weld repair shall be determined based on a risk-based inspection program developed and implemented as required by NBIC Part 2, 4.5. The inspection interval shall not exceed the remaining life of the item, and shall be documented on the Form NB-403 and in the Remarks section of the Form R-1. The Form NB-403 shall be affixed to the Form R-1. A National Board Commissioned Inspector holding an "R" endorsement as described in NB-263, RCI-1 shall sign both the Form R-1 and the attached Form NB-403.
- 6) A copy of the completed Form R-1 with the completed Form NB-403 attached may be registered with the National Board, and when required, filed with the Jurisdiction where the item was installed.

SXX.2.3 REPAIR OF ASME SECTION VIII, DIVISION 2 OR DIVISION 3 PRESSURE VESSELS

a) Scope

The following requirements shall apply for the repair of pressure vessels constructed to the requirements of Section VIII, Division 2 or 3 of the ASME Code.

b) Repair Plan

The user shall prepare or cause to have prepared, a detailed plan covering the scope of repair.

1) Engineer Review and Certification

The repair plan shall be reviewed and certified by an engineer meeting the criteria of ASME Section VIII, Division 2 or 3, as applicable, for an engineer signing and certifying a Manufacturer's Data Report. The review and certification shall be such as to ensure the work involved in the repair is compatible with the User's Design Specification and the Manufacturer's Data Report. The certifying requirement may be waived for ASME Section VIII, Division 2, Class 1 vessels that did not require the Manufacturer's Design Report to be certified during initial construction.

Note: The engineer qualification criteria of the Jurisdiction where the pressure vessel is installed should be verified before selecting the certifying repair.

2) Authorized Inspection Agency Acceptance

Following review and certification, the repair plan shall be submitted for acceptance to the Authorized Inspection Agency/Owner-User Inspection Organization whose Inspector will make the acceptance inspection and sign the Form R-1.

SXX.3 ENGINEERED ALTERATION METHODS

SXX.3.1 ENCAPSULATION

Encapsulation is a method used to maintain the pressure retaining capability of piping and valves (with the exception of firetube boilers) by fabricating a new pressure containing boundary over the item in the form of a “welded leak box” as described by ASME PCC-2, Article 204.

- a) Except as required in SXX.3.1 c) 1), ASME PCC-2 should be used as a guideline for the design of the welded leak box and fabrication shall be in accordance with the original code of construction, when practicable. Design of the encapsulation shall consider original design conditions, taking into account current service conditions and damage mechanisms. Use of this method shall be acceptable to the inspector and when required, the jurisdiction.
- b) The “R” Certificate Holder responsible for the design of the encapsulation shall ensure a Fitness for Service Assessment (FFSA) has been performed on the portion of the item being encapsulated in accordance with NBIC Part 2, 4.4.1, supporting the continued service of the item. The leak box shall not remain in place beyond the calculated remaining life of the encapsulated portion of the pressure retaining item.
 - 1) The remaining life of the encapsulated 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-2 and identified in the Remarks section.
 - 2) The leak box shall fully encapsulate the thinned or leaking area, 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.
 - 3) A welded leak box shall not be used to encapsulate a crack unless it has been removed and repaired in accordance with Part 3, Paragraph 3.3.4.2 a).
- c) 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.
 - 1) When the pressure retaining item will remain in service while implementing this method, the requirements and limitations described within ASME PCC-2, Part-1 shall be used in conjunction with the Welded Leak Box Repair article in ASME PCC-2, Part-2, Article 210.
 - 2) 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.
- d) Visual examination shall be in accordance with the NBIC Part 3, 4.4.1 e).
- e) Completion of the Form R-2 shall follow the requirements for preparation, distribution, and registration as described in Part 3, Section 5.

SXX.3.2 ALTERATION OF ASME SECTION VIII, DIVISION 2 OR 3, PRESSURE VESSELS

a) Alteration Plan

1) Engineer Review and Certification

- a. The alteration plan shall be reviewed and certified by an engineer meeting the criteria of ASME Section VIII, Division 2 or 3, as applicable, for an engineer signing and certifying a Manufacturer's Design Report. The review and certification shall be such as to ensure the work involved in the alteration is compatible with the User's Design Specification and the Manufacturer's Design Report.
- b. Provided that the alteration does not introduce a condition that would require an engineer to sign the Manufacturer's Design Report for ASME Section VIII, Division 2, Class 1 vessels, the certifying requirement may be waived for vessels that did not require the Manufacturer's Design Report to be certified during initial construction.

Note: The engineer qualification criteria of the jurisdiction where the pressure vessel is installed should be verified before selecting the certifying engineer.

2) User's Design Specification

If the alteration is such that the work is not compatible with, or changes one or more requirement(s) of the original user's design specification, the user's design specification shall be revised by the user with the new parameters or changes. The revisions shall be certified by an engineer meeting the criteria of ASME Section VIII, Division 2 or 3, as applicable, for an engineer signing and certifying a Manufacturer's Design Report.

Note: The engineer qualification criteria of the Jurisdiction where the pressure vessel is installed should be verified before selecting the certifying engineer.

3) Manufacturer's Design Report

- a. The "R" Certificate Holder shall prepare, or cause to have prepared a supplement to the Manufacturer's Design Report to reconcile the new parameters or changes with the User's Design Specification.
- b. The supplement to the Manufacturer's Design Report shall be certified by an engineer meeting the criteria of ASME Section VIII, Division 2 or 3, as applicable, for an engineer signing and certifying a Manufacturer's Design Report.

Note: The engineer qualification criteria of the Jurisdiction where the pressure vessel is installed should be verified before selecting the certifying engineer.

4) Authorized Inspection Agency Acceptance

Following review and certification, the alteration plan shall be submitted for acceptance to the Authorized Inspection Agency/Owner-User Inspection Organization whose inspector will make the acceptance inspection and sign the Form R-2.



PROPOSED REVISION OR ADDITION

Item No. A 24-12	
Subject/Title Reference to change of service for LPG vessels incorrectly uses "altered"	
NBIC Location Part: Repairs and Alterations; Section: Supplement 7; Paragraph: S7.5	
Project Manager and Task Group	
Source (Name/Email) Thomas Vandini / tvandini@propanetank.com	
Statement of Need Conversion of service for LPG tanks (typically from above ground to underground service) typically involves changes to the vessel covered under Part 3, Paragraph 3.3.3 and, as such, are considered repairs. As such, the language referring to these conversions that uses the word "altered" may be confusing to an inspector or other user of NBIC. I suggest changing the word "altered" to "changed". This action item was previously submitted requesting changes to both Part 2 and Part 3 under Item 23-30. The changes to Part 2 were reviewed and approved by SG Inspection, SC Inspection, and Main Committee in July 2023. However, a separate action item to address the changed needed in Part 3 was never opened. Therefore, I'm submitting this now as a new action item for Part 3. A similar language change has already been approved for Part 2. This change request is to synchronize the language in both parts.	
Background Information This action item was previously submitted requesting changes to both Part 2 and Part 3 under Item 23-30. The changes to Part 2 were reviewed and approved by SG Inspection, SC Inspection, and Main Committee in July 2023. However, a separate action item to address the changed needed in Part 3 was never opened. Therefore, I'm submitting this now as a new action item for Part 3. A similar language change has already been approved for Part 2. This change request is to synchronize the language in both parts.	
Existing Text ASME LPG storage vessels may be altered from above ground (AG) service to underground (UG) service subject to the conditions of NBIC Part 2, S7.10.	Proposed Text ASME LPG storage vessels may be altered changed from above ground (AG) service to underground (UG) service subject to the conditions of NBIC Part 2, S7.10.

COMMITTEE	VOTE:				Passed	Failed	Date
	Approved	Disapproved	Abstained	Not Voting			



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PROPOSED REVISION OR ADDITION

Item No. A 24-15
Subject/Title NDE requirements
NBIC Location Part: Repairs and Alterations; Section: 4; Paragraph: 4.2
Project Manager and Task Group Michael Quisenberry (PM), Melissa Wadkinson, Raymond Spuhl, Steve Frazier
Source (Name/Email) Kathy Moore / kathymoore@joemoorecompany.com
Statement of Need B31.1 has introduced very stringent requirements on the R-Certificate holders that will create an unnecessary burden on them.
Background Information During the Q&A period after the presentation was given, I asked the members of B31.1 committee what was the driving force behind the change? Were there any near misses of accidents that they were aware of to drive this change. The answer was "No. They are simply trying to align B31.1 and B31.3.

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. 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. Where the welds were subject to volumetric NDE during construction, repairs may be made to the base material and weld joints without volumetric examination under the following conditions:
- 1) The repair depth does not exceed the lesser of 1/8 inch (3 mm) or 25% of the nominal base material thickness;
 - 2) The aggregate repair length is no longer than 6 inches (150 mm);
 - 3) The repair cavity and each layer of deposited weld, including the final weld surface, have been examined by MT or PT.

- b) When volumetric NDE is required by the original code of construction but is not possible or practicable, progressive liquid penetrant or magnetic particle examination as described in paragraph 4.2 (b)(1) may be used. This alternative NDE method is subject to the acceptance of the Inspector, owner and when required, the Jurisdiction where the pressure-retaining item is installed, provided that all other requirements of this section are met.
- 1) Progressive liquid penetrant or magnetic particle examination shall be performed on each layer of the weld to be examined, including the final weld. Prior to performing PT or MT the surface of each layer of weld shall be properly prepared for examination. The final weld may be examined with or without grinding. The NDE report shall include the number of layers examined. This alternative NDE method shall be documented in the remarks section of the applicable R-form.
- c) NDE personnel **utilizing volumetric examination methods** shall be qualified and certified in accordance with the requirements of the original code of construction, **standard, or specification selected for the repair or alteration of the pressure-retaining item (see NBIC Part 3, 1.2)**. When this is not possible or practicable, NDE personnel may be qualified and certified in accordance with their employer's written practice. ASNT SNT-TC-1A, *Recommended Practice Nondestructive Testing Personnel Qualification and Certification* (2006 edition), or ANSI/ASNT CP-189, *Standard for Qualification and Certification of Nondestructive Testing Personnel* (2006 edition), shall be used as a guideline for employers to establish their written practice. Provisions for training, experience, qualification, and certification of NDE personnel shall be described in the "R" Certificate Holder's written quality system.
- d) **NDE personnel utilizing NDE examination methods other than volumetric such as visual examination (VT), liquid penetrant (PT), or magnetic particle (MT) may be qualified and certified in accordance with a program established by the employer of the personnel being certified, which shall be based on the following minimum requirements:**
- a) **Instruction in the fundamentals of the applicable NDE method.**
 - b) **on-the-job training to familiarize the NDE personnel with the appearance and interpretation of indications of weld defect. The length of time for such training shall be sufficient to ensure adequate assimilation of the knowledge required.**
 - c) **a visual acuity examination performed at least once each year to determine optical capability of NDE personnel to perform the required examinations.**
 - d) **upon completion of a) and b) above, the NDE personnel shall be given a written examination and performance examination by the employer to determine if the NDE personnel are qualified to perform the required examinations and interpretation of results.**
 - e) **certified NDE personnel whose work has not included performance of a specific examination method for a period of 1yr or more shall be recertified by successfully completing the examination of d) and also passing the visual examination of c). Substantial changes in procedures or equipment shall require recertification of NDE personnel.**
- As an alternative to a) through e) above, the requirements of ASME BPVC, Section V, Article 1, T-120(e) or T-120(f) may be used for the qualification of NDE personnel. Personnel qualified to AWS QC1 may be used for the visual examination of welds provided they meet the annual visual acuity examination requirement of (c) and the Jaeger J1 visual acuity requirement of ASME BPVC, Section V, Article 9.**

Notes:

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. 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. Where the welds were subject to volumetric NDE during construction, repairs may be made to the base material and weld joints without volumetric examination under the following conditions:



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PROPOSED REVISION OR ADDITION

Item No. A 24-18 Rev 01		
Subject/Title Controlled Fill Definition		
NBIC Location All Parts, Section 9, Glossary of Terms		
Project Manager and Task Group Philip Gilston (PM), A. Triplett		
Source (Name/email) Philip Gilston (philip_gilston@hsb.com)		
Statement of Need There is no definition of the term 'controlled fill'.		
Background Information Interpretation item I 23-79 addresses the use of the term 'controlled fill' in NBIC Part 3, 2.5.3 d in relation to Welding Method 6 for Grade 91 material. While the term 'controlled fill' is not specifically used in the text of Welding Method 6 (2.5.3.6), directions are given for such variables as typical preheats, electrode size for SMAW, and the use of stringer beads only. The term is used explicitly in Supplement 8 for CSEF repairs, where S8.3.b says that "To control heat input the weld repair shall be performed using a "controlled fill" technique"; details are also given on such items as preheats, electrode size, required fill pass overlap, etc., and a lot of detail is provided in schematics including specifics on weld bead placement.		
Existing Text None	Proposed Text <u>Changes from Rev 00 shown</u> Controlled Fill – requirements specified <u>control of weld technique</u> for a permitted weld repair process in order to manage heat input to ensure <u>satisfactory weld properties</u> by <u>controlling distortion, promoting tempering and minimizing the risk of cracking by</u> addressing variables <u>including but not limited to heat input, such as</u> preheat and interpass temperature, weld consumable type and diameter <u>size</u> , weld technique (string or weave), and bead placement etc.	Clean Copy Controlled Fill – control of weld technique for a repair process to ensure satisfactory weld properties by controlling distortion, promoting tempering and minimizing the risk of cracking by addressing variables including but not limited to heat input, preheat and interpass temperature, weld consumable type and size, weld technique (string or weave) and bead placement.

Committee	VOTE				Passed	Failed	Date
	Approved	Disapproved	Abstained	Not Voting			



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PROPOSED REVISION OR ADDITION

Item No. A 24-22	
Subject/Title Alternative Welding Methods without PWHT- Competent Technical Advice	
NBIC Location Part: Repairs and Alterations & Repairs and Alterations; Section: 2 & 1; Paragraph: 2.5.3 (b) & Table 1.5.1	
Project Manager and Task Group E. Cutlip (PM), J. Ferreira, G. Galanes	
Source (Name/Email) Jonathan Ferreira / jonathan_ferreira@hsb.com	
Statement of Need The first sentence of 2.5.3 (b) requires the competent technical advice to be obtained for the use of every alternative welding method which can be impractical. In most cases, the R certificate firm that is making the determination to use alternative welding method. Most R-certificate holders do not retain a record of the component technical advice they may get. Competent technical advice is used in paragraph 3.2.1 and 3.3.4.3 (d)(1) and the wording states competent technical advice should be obtained. But in 2.5.3 (b) states competent technical advice shall be obtained.	
Background Information During a joint review, the review resulted in a 30-day follow-up as the R-certificate holder did not have written objective evidence that competent technical advice was obtained to use alternative welding method 1, even though the R-certificate hold was the actual OEM of the PRI being repaired. The way the current paragraph 2.5.3 (b) is worded, a record would have to retained for such technical advice. Which I think is fine if the alternative welding methods are being used in highly stressed areas, if service conditions are conducive to stress corrosion cracking, if materials are subject to hydrogen embrittlement, or are operating at temperatures in the creep range, or if the alternative is being considered for "on-stream" repairs or "hot tapping" on piping systems. If none of those conditions are applicable, then I think it should not be mandatory to obtain technical advice nevertheless retain such information.	
Existing Text Competent technical advice shall be obtained from the manufacturer of the pressure-retaining item or from another qualified source, such advice being especially necessary if the alternative is to be used in highly stressed areas, if service conditions are conducive to stress corrosion cracking, if materials are subject to hydrogen embrittlement, or are operating at temperatures in the creep range, or if the alternative is being considered for "on-stream" repairs or "hot tapping" on piping systems. Selection of the welding method used shall be based on the rules of the original code of construction together with the above mentioned advice concerning the adequacy of the weld in the as-welded condition at operating and pressure test conditions.	Proposed Text Competent technical advice shall <u>should</u> be obtained from the manufacturer of the pressure-retaining item or from another qualified source, such advice being especially necessary if the alternative is to be used in highly stressed areas, if service conditions are conducive to stress corrosion cracking, if materials are subject to hydrogen embrittlement, or are operating at temperatures in the creep range, or if the alternative is being considered for "on-stream" repairs or "hot tapping" on piping systems. Selection of the welding method used shall be based on the rules of the original code of construction together with the above mentioned advice concerning the adequacy of the weld in the as-welded condition at operating and pressure test conditions.



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PROPOSED REVISION OR ADDITION

Item No. A 24-43	
Subject/Title Certification of Reports of Repair without stamping - Action Item with I24-39	
NBIC Location Part: Repairs and Alterations; Section: 1.3; Paragraph: 1.3.2	
Project Manager and Task Group Mark Vogt / mark.vogt@vistracorp.com	
Source (Name/Email) Terrence Hellman / thellman@nationalboard.org	
Statement of Need Given INTERP 21-16 requirements, clarity is needed for R/NR work where the lack of stamping due to a practical matter, not necessarily a jurisdictional reason, may preclude certifying an Report of Repair. This Action Item is tied to Intent Interp I24-39.	
Background Information I21-16 states that an Inspector shall not certify the R-1 if the Jurisdictional requirements do not meet the NBIC requirements. Would the lack of stamping the R or NR due to a safety matter, not necessarily a jurisdictional reason, also preclude certifying a Report of Repair, e.g. would repair or replacement work done in a space that is too unsafe to allow the stamping of the R or NR mark on the item, also preclude certifying the applicable Report of Repair?	
Existing Text See next page.	Proposed Text See next page.

COMMITTEE	VOTE:				Passed	Failed	Date
	Approved	Disapproved	Abstained	Not Voting			

Existing Text

NBIC Part 3, Section 5.7 Stamping Requirements for Repairs and Alterations

5.7.1 General

The stamping of or attachment of a nameplate to a pressure-retaining item shall indicate that the work was performed in accordance with the requirements of this code. Such stamping or attaching of a nameplate shall be done only with the knowledge and authorization of the Inspector. The "R" Certificate Holder responsible for repair or the construction portion of the alteration shall apply stamping. For a re-rating where no physical changes are made to the pressure-retaining item, the "R" Certificate Holder responsible for design shall apply stamping.

Proposed Text

NBIC Part 3, Section 5.7 Stamping Requirements

5.7.1 General

a) The stamping of or attachment of a nameplate to a pressure-retaining item shall indicate that the work was performed in accordance with the requirements of this code. Such stamping or attaching of a nameplate shall be done only with the knowledge and authorization of the Inspector. The "R" Certificate Holder responsible for repair or the construction portion of the alteration shall apply stamping. For a re-rating where no physical changes are made to the pressure-retaining item, the "R" Certificate Holder responsible for design shall apply stamping.

b) Where the Owner is also the "NR" Certificate Holder and application of the National Board Code Symbol is not possible due to a practical matter (e.g., personnel safety, potential contamination, etc.) and all other requirements of the NBIC have been met, stamping of or attachment of a nameplate may be waived with the acceptance of the Jurisdiction provided it is addressed in the NR Certificate Holder's QA program. Justification shall be noted in the "Remarks" section of the Form NR-1 or Form NVR-1.

