



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

NATIONAL BOARD INSPECTION CODE SUBGROUP REPAIRS & ALTERATIONS

MINUTES

**Meeting of January 9th, 2024
San Antonio, TX**

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

The National Board of Boiler & Pressure
Vessel Inspectors 1055 Crupper Avenue
Columbus, Ohio 43229-
1183
Phone: (614)888-8320
FAX: (614)847-1828

1. Call to Order

Chair Underwood called the meeting to order at 8:00 a.m. Central Time in the Iberian A and B rooms 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 C for the 2025 NBIC edition. The committees will have until the end of the July 2024 NBIC meeting to approve items for inclusion in the 2025 NBIC.
- The National Board will be hosting a reception on Wednesday evening from 5:30 p.m. to 7:30 p.m. in Veramendi (fourth level of the hotel).
- The National Board will be hosting breakfast and lunch on Thursday in Veramendi 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. If you are here in person, and did not register, please visit the National Board website to register now. Registering will make sure we have an

accurate count for the reception, breakfast, and lunch. It is also a good way to make sure we have the most up-to-date contact information.

5. Awards and Special Recognitions

Mr. Mike Quisenberry was presented with an award by Chair Underwood for 5 Years on Subgroup R&A

6. Adoption of the Agenda

The Agenda was revised to add membership nominations and editorial corrections to items listed. The agenda was UA.

7. Approval of the Minutes of the July 11, 2023, Meeting

The minutes were unanimously approved (UA).

8. ASME/API Presentation ([Attachment 2](#))

Presentation from Mr. Sowinski – Mr. Sowinski is a member of the ASME BPV VIII Standards committee and the Chair of BPV VIII Subgroup Design. Mr. Sowinski is also a member of BPV VIII Subgroup General Requirements and the Special Committee on Interpretations.

The Subgroup Inspection joined the Subgroup R&A meeting.

Mr. Troutt spoke to the two groups regarding some of the conversations the Chiefs have had recently and how the NBIC SGs and SCs should take the Chief's considerations into account when voting on items, as they directly impact what jurisdictions can enforce.

Mr. John Burpee spoke to the groups encouraging involvement from and with Chiefs in Part 2 and 3 SG and SC, as the Jurisdictions should be more involved overall.

Mr. Gary Scribner Spoke to the groups. He discussed the attendance at the NBIC meetings and how we have grown. He also discussed the Spanish version of the NBIC. Lastly, he discussed how the National Board will continue to use remote access for meetings and shop reviews.

Ms. Melissa Wadkinson also spoke to the groups regarding how the NBIC groups/committees can work together to make the NBIC better.

Mr. George Galanes spoke to the groups regarding how committee/group members should speak to people outside of the committees/groups. He wanted to reiterate how these conversations should be handled as personal opinions and not committee opinions.

Mr. Jim Sowinski gave a presentation regarding ASME and API to Inspection and R& A subgroups. Mr. Sowinski then received many questions and comments from the groups.

9. Review of Rosters

a. Membership Nominations – The following individuals were UA for SG R&A membership:

- i.** Mr. Mr. Mark Vogt (Users) .
- ii.** Mr. Riley Collins (Users)
Mr. Matt Schaser (Cert. Holder)

b. Membership Reappointments

- i. The following Subgroup R&A memberships are set to expire prior to the January 2024 NBIC meetings were reappointed to the SG R&A:
 - Mr. Frank Johnson- UA
 - Mr. Tom White - UA

c. Officer Nominations

d. Resignations

- i. Don Kinney (Jurisdiction) will be stepping down from Subgroup R&A and Subcommittee R&A.
- ii. Kathy Moore (Cert. Holder) will be letting her membership expire from Subgroup R&A
- iii. Brian Moorelock (Users) will be letting his membership expire from Subgroup R&A

10. Action Items

Item Number: A21-12	NBIC Location: Part 3, 3.3.3, 3.4.4, Section 9	Attachment 3
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.		
July 2023 Meeting Action: P. Becker proposed a Rvw & Comment LB to SG R&A only. The proposal was UA.		
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.		

Item Number: A21-31	NBIC Location: NBIC Glossary	No Attachment
<p>General Description: Revise definition of "Field"</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: R. Miletti (PM), P. Gilston, M. Toth, J. Walker</p> <p>Explanation of Need: A "Field" site under the current definition could be multiple rented or leased spaces used for repairs/alterations, where there is no single or specific customer or job, but rather the locations(s) are used for conducting repair/alteration activities by personnel employed by the Certificate Holder on a continual basis.</p> <p>July 2023 Meeting Action: P. Gilston presented that the NB-415 has been revised to add definitions of "Temporary Locations" so this proposal is being worked on. This was a PR.</p> <p>Update – Passed SG LB (22-0-2) in Dec. 2023</p> <p>Jan. 2024 Meeting Action: R. Miletti presented a PR; as this is ready for SC.</p>		

Item Number: A21-43	NBIC Location: Part 3, Glossary	No Attachment
<p>General Description: Defining and revising "Practicable" and "Practical" within the NBIC</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: M. Toth (PM), B. Underwood, L. Dutra, R. Collins, P. Davis, T. White, L. Moedinger, A. Triplett</p> <p>Explanation of Need: Defining and revising Practicable and Practical within the NBIC and revising where applicable</p> <p>July 2023 Meeting Action: T. Hellman presented a PR.</p> <p>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</p>		

Item Number: A21-44	NBIC Location: Part 3, Glossary	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		
July 2023 Meeting Action: T. Hellman presented a PR.		
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		

Item Number: A21-45	NBIC Location: Part 3, Supplements	No Attachment
General Description: Engineered Repairs and Alterations Supplement		
Subgroup: Repairs and Alterations		
Task Group: R. Underwood (PM), B. Boseo, B. Ray, D. Marek, M. Schaser		
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.		
July 2023 Meeting Action: B. Underwood presented the initial scope statement and plan for moving “engineered repairs” currently in the NBIC to the new supplement. The proposal in moving existing ‘engineered repairs’ to a new supplement was revised and UA.		
Update – Passed SG LB (20-2-0) in Dec. 2023		
Jan. 2024 Meeting Action: R. Underwood presented a PR; this proposal is ready for SC.		

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>July 2023 Meeting Action: SG Inspection will be voting on this today. A. Triplett was added to TG. This was a PR.</p> <p>Jan. 2024 Meeting Action: P. Gilston presented a PR.</p>		

Item Number: A21-67	NBIC Location: Part 3, 3.4.9	No Attachment
<p>General Description: Add welding requirements to plugging firetubes</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: P. Gilston (PM), K. Moore, M. Quisenberry, T. Sieme</p> <p>Explanation of Need: The current NBIC does not have enough direction or requirements for welding tube plugs in firetubes.</p> <p>July 2023 Meeting Action: P. Gilston presented the revision made to the proposal based on Rvw & Comment LB comments received. This proposal has passed SG LB already and will be in SC R&A tomorrow.</p> <p>***Note that this item was approved by MC in July and then re-opened to address a comment from Mr. George Galanes. This updated proposal has been approved by the SG and SC.***</p> <p>Update – Passed SC LB (14-2-0) in Dec. 2023</p> <p>Jan. 2024 Meeting Action: P. Gilston presented a PR; this proposal is ready for MC.</p>		

Item Number: A22-18	NBIC Location: Part 3, Glossary	No Attachment
General Description: Definition of blowdown and blowoff		
Subgroup: Repairs and Alterations		
Task Group: K. Moore (PM). M. Quisenberry, G. Scribner, M. Wadkinson		
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.		
July 2023 Meeting Action: K. Moore presented a PR.		
Jan. 2024 Meeting Action: K. Moore presented a PR.		

Item Number: A22-19	NBIC Location: Part 3, 5.2.2	Attachment 4
General Description: R Certificate Holders with Design Only Scope		
Subgroup: Repairs and Alterations		
Task Group: J. Ferreira (PM), R. Valdez, G. Scribner, B. Schaefer, M. Schaser		
Explanation of Need: To add new paragraphs 5.2.2 d) and 5.2.2 e) which will provide guidance for R Certificate Holders with "Design Only" on which activities they are permitted to perform and how they and the Inspectors shall complete the R-2 Form.		
July 2023 Meeting Action: M. Schaser presented. UA as revised.		
Update – Item has been revised and will be re-considered by SG and SC.		
Jan. 2024 Meeting Action: J. Ferreira presented. The proposal was revised and UA.		

Item Number: A22-41	NBIC Location: Part 3, 1.5	Attachment 5
General Description: Reference NB-415 in Quality System		
Subgroup: Repairs and Alterations		
Task Group: P. Davis selected as PM. Added M. Carlson and J. Walker, L. Ponce		
Explanation of Need: Requirements in the NB-415 should be included in the R Cert. Holder's QC Manual. Examples: a) Notifying the National Board when an organization changes scope, ownership, name, location, address, or Inspection Agreement and b) Return of the stamp.		
July 2023 Meeting Action: K. Moore presented a PR.		
Jan. 2024 Meeting Action: P. Davis presented. The proposal was revised and UA.		

Item Number: A23-13	NBIC Location: Part 3, 3.3.3 s)	Attachment 6
General Description: Consistent addressing of the term for weld metal		
Subgroup: Repairs and Alterations		
Task Group: P. Gilston (PM), W. Sperko, J. Siefert, T. Melfi, F. Johnson		
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.		
July 2023 Meeting Action: P. Gilston presented. The proposal was UA.		
Update – Passed LB in all SGs EXCEPT for Part 4.		
Jan. 2024 Meeting Action: P. Gilston presented. The proposal had been revised based on Part 4 comments. The proposal was UA.		

Item Number: A23-14	NBIC Location: Part 3, Table S9.2	No Attachment
General Description: Extension Instructions for Reports of Repair		
Subgroup: Repairs and Alterations		
Task Group: M. Quisenberry (PM)		
Explanation of Need: Additional text should be added to Instruction (29) of Table S9.2 of Supplement 9 (listing the "R" Cert. of Auth expiration date), to provide instructions on how to document if the "R" Cert. Holder is operating under an extension.		
July 2023 Meeting Action: M. Quisenberry presented a PR.		
Update – SG LB in progress till 12/29/23 – PM RESPONSE NEEDED		
Jan. 2024 Meeting Action: M. Quisenberry presented that Extension instructions are issued by NBBI Tech. Staff when issuing extensions. A motion to Close w/No Action was UA.		

Item Number: A23-21	NBIC Location: Part 3, 3.3.4.9	No Attachment
General Description: Boiler tube plug guidelines and inclusion or watertube boilers		
Subgroup: Repairs and Alterations		
Task Group: E. Cutlip (PM), P. Gilston, K. Moore, A. Triplett		
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.		
July 2023 Meeting Action: K. Moore presented a PR. A. Triplett was added to the TG.		
Jan. 2024 Meeting Action: E. Cutlip presented a PR		

Item Number: A23-24	NBIC Location: Part 3	No Attachment
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 2023 Meeting Action: T. McBee presented a PR, as this item is being worked in collaboration with Part 2.		
Jan. 2024 Meeting Action: T. McBee presented a PR.		

Item Number: A23-29	NBIC Location: Part 3, 1.5.1 s)	No Attachment
General Description: Clarification of Intent		
Subgroup: Repairs and Alterations		
Task Group: A. Triplett (PM), P. Becker		
Explanation of Need: The sentence is unclear as it currently reads. With the new wording it clarifies the intent.		
July 2023 Meeting Action: New PM selected – Andrew Triplett, as Mr. Chestnut will not be continuing with SG membership. Added Pat Becker as TG member. This was a PR.		
Jan. 2024 Meeting Action: A. Triplett presented that the origin of this proposal is unknown, and the sentence was determined to be clear by the SG. A motion to Close w/No Action was UA.		

Item Number: A23-36	NBIC Location: Part 3, 4.2 a) and 4.4 b)	Attachment 7
General Description: Clarifying Rules for Using Alternative NDE Methods		
Subgroup: Repairs and Alterations		
Task Group: Tom White (PM), P. Miller		
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.		
July 2023 Meeting Action: T. White proposed to CLOSE W/NO ACTION as this is addressed under A23-04. The proposal to Close was UA. This motion to close w/ no action was later Disapproved by Main Committee.		
Jan. 2024 Meeting Action: T. White presented a proposal based on MC feedback. The proposal was revised and UA by the SG R&A.		

Item Number: A23-38	NBIC Location: Part 3, 1.1 a)	No Attachment
General Description: Scope Clarification for Part 3		
Subgroup: Repairs and Alterations		
Task Group: M. Quisenberry (PM), R. Spuhl, P. Davis, T. Seime, A. Henson		
Explanation of Need: The owner or user's need to return equipment to service must never compromise the operational safety of the equipment or the process by which the operational safety of the equipment is assured. There is an interpretation that supports this notion by describing subjects permitted to be considered when determining whether a repair or alteration activity is practicable.		
July 2023 Meeting Action: M. Quisenberry presented a PR.		
Jan. 2024 Meeting Action: M. Quisenberry presented that this scope will need to be approved by the BOT, (not the NBIC Committee). A motion to Close w/No Action was UA.		

Item Number: A23-39	NBIC Location: Part 3, 3.3.1	Attachment 8
<p>General Description: Strengthening Prevention of Defect Recurrence</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: J. Ferreira (PM), J. Walker, F. Johnson</p> <p>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.</p> <p>July 2023 Meeting Action: J. Ferreira presented a PR.</p> <p>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).</p>		

Item Number: A23-40	NBIC Location: Part 3, 3.3.4.1	No Attachment
<p>General Description: Strengthening Requirements to Ensure Defect Removal</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: L. Dutra (PM), E. Cutlip, A. Renaldo, R. Valdez, T. McBee, A. Henson</p> <p>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.</p> <p>July 2023 Meeting Action: L. Dutra selected as PM. This was a PR.</p> <p>Jan. 2024 Meeting Action: L. Dutra presented a PR.</p>		

Item Number: A23-41	NBIC Location: Part 3, 3.3.4.6 a) 2)	No Attachment
<p>General Description: Strengthening Requirements for Defect Removal When Patching</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: A. Khssassi (PM), L. Dutra, A. Renaldo</p> <p>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.</p> <p>July 2023 Meeting Action: New PM selected - A. Khssassi (PM). This was a PR.</p> <p>Update – Failed SG LB (11-5-8) in Dec. 2023</p> <p>Jan. 2024 Meeting Action: A. Khssassi presented a PR</p>		

New Action Items:

Item Number: A23-56	NBIC Location: Part 3, 1.3.2	No Attachment
<p>General Description: Alternate Repair Inspectors</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: A. Triplett (PM), P. Lentzer</p> <p>Explanation of Need: The 2023 Edition revision to 1.3.2.a makes the use of alternate Inspectors applicable only to AIAs. The language should be revised to include OUIOs and FIAs that perform repairs/alterations on their own equipment, as allowed by 1.3.b.</p> <p>January 2024 Meeting Action: A. Triplett presented that this definition is already addressed elsewhere. A motion to Close w/No Action was UA.</p>		

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).		

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 .		

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.		

Item Number: A23-69	NBIC Location: Part 3, 9.1	Attachment 9
<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. Gilston</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>		

Item Number: A23-76	NBIC Location: Part 3, 3.3.4.6 a)	No Attachment
<p>General Description: Revise paragraph 3.3.4.6 Patches for Clarity.</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: None assigned.</p> <p>Explanation of Need: Requirements do not include specific note to ensure sound metal meets minimum design thickness. Further the order of the rules is not logical, starts with finished weld, grinding and NDE, then addresses defect removal, preparation etc.</p> <p>January 2024 Meeting Action: T. Hellman presented that this item is addressed by A23-41. A motion to combine W/A23-41 and CLOSE W/NO ACTION was UA.</p>		

Item Number: A23-77	NBIC Location: Part 3, 4.2 a)	No Attachment
<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> <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>		

Item Number: A23-78	NBIC Location: Part 3, S8	No Attachment
<p>General Description: Rev. NB-23 Part 3, Supplement 8 & Fig. S8.3-b</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: P. Becker (PM)</p> <p>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</p> <p>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.</p>		

Item Number: A23-83	NBIC Location: Part 3, New Engineered repairs and Alteration Supplement	No Attachment
<p>General Description: Relocating Existing Repairs to new Eng. Repair & Alteration Supplement</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: R. Underwood (PM)</p> <p>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.</p> <p>Update - SG LB in Progress till 1/5/24</p> <p>January 2024 Meeting Action: R. Underwood presented a PR as this item will be presented to SC R&A.</p>		

Item Number: A23-86	NBIC Location: Part 3, S6.5 & S6.6	Attachment 10
<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>		

Item Number: A24-01	NBIC Location: Part 3, 3.3.3 j)	Attachment 11
General Description: Changes to Examples of Repairs		
Subgroup: Repairs and Alterations		
Task Group: M. Schaser (PM), R. Collins, C. Hopkins, K. Derrick, S. Lombardo		
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.		
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		

Item Number: A24-02	NBIC Location: S6.18 & S6.18.3	Attachment 12
General Description: Correction of duplicated words from approved A20-67 and A23-25		
Subgroup: Repairs and Alterations		
Task Group: P. Gilston (PM),		
Explanation of Need: This proposal is to DELETE the last sentence from S6.18 (as approved to be in the 2025 Edition via A23-25) as the new paragraph "S6.18.3" created by the approved item A20-67 already will addresses this requirement in the 2025 Edition.		
January 2024 Meeting Action: P. Gilston presented a proposal, which was UA .		

Main Committee Item

Item Number: A23-09	NBIC Location: Part 3	Attachment 13
General Description: Developing Rules for Additive Manufacturing Pressure Parts		
Subgroup: Repairs and Alterations		
Task Group: G. Galanes (PM), J. Siefert, B. Schaefer, W. Sperko, J. Ferreira, J. Getter, T. Seime, and M. Wadkinson.		
Explanation of Need: Determining appropriate rules and scope for the use of additive manufacturing pressure parts on pressure-retaining items.		
January 2024 Meeting Action: G. Galanes presented a proposal that will be going to SG R&A as a RVW and Comment LB .		

11. Future Meetings

- July 15-18, 2024 – The Brown Hotel in Louisville, KY
- January 2025 – TBD

12. Adjournment @ 4:58 PM by Chair Underwood.

Respectfully submitted,

Terrence Hellman

Terrence Hellman

SG R&A Secretary

Session Name	Email Address	First Name	Last Name	Company Name	Registration Type
Subgroup Repairs and Alterations	jamato@nationalboard.org	Joel	Amato	NBBI	In-person
Subgroup Repairs and Alterations	rarn@aws.com	Richard	Arn	American Welding Society	In-person
Subgroup Repairs and Alterations	lbaker@us.tuv.com	Lane	Baker	TUV Rheinland	Remote
Subgroup Repairs and Alterations	lbarr@propanetank.com	Larry	Barr	Quality Steel Corporation	Remote
Subgroup Repairs and Alterations	bateslocal26@yahoo.com	Johnathon	Bates	Boilermakers	In-person
Subgroup Repairs and Alterations	pbecker@epri.com	Pat	Becker	EPRI	In-person
Subgroup Repairs and Alterations	mlboobar@firstquality.com	Matt	Boobar	First Quality Tissue	In-person
Subgroup Repairs and Alterations	bmboseo@burnsmcd.com	Brian	Boseo	Burns & McDonnell Construction	In-person
Subgroup Repairs and Alterations	camx235@lni.wa.gov	Mike	Carlson	State of Washington	In-person
Subgroup Repairs and Alterations	ncarter@aws.org	Nathan	Carter	American Welding Society	In-person
Subgroup Repairs and Alterations	kinwai.cheng@dot.gov	Alex	Cheng	US Dept of Transportation - PHMSA	In-person
Subgroup Repairs and Alterations	kevin.choi@cummins.com	Kevin	Choi	Cummins	Remote
Subgroup Repairs and Alterations	rileycollins@eastman.com	Riley	Collins	Eastman Chemical Company	In-person
Subgroup Repairs and Alterations	Matthew.cox@ge.com	Matthew	Cox	GE Steam Power	Remote
Subgroup Repairs and Alterations	paul.davis22@woodplc.com	Paul	Davis	Wood Group USA, Inc.	In-person
Subgroup Repairs and Alterations	billy.dekeyzer@trilliumflow.com	Billy	DeKeyzer	Trillium Flow Technology	In-person
Subgroup Repairs and Alterations	rderby@uanet.org	Bob	Derby	United Association Education and Training Department	In-person
Subgroup Repairs and Alterations	kiwi.derrick@chevron.com	Kiwi	Derrick	Chevron	In-person
Subgroup Repairs and Alterations	cdinic@tssa.org	Caslav	Dinic	Technical Standards and Safety Authority - Ontario	Remote
Subgroup Repairs and Alterations	ldutra@baycityboiler.com	Louis	Dutra	Bay City Boiler	In-person
Subgroup Repairs and Alterations	Donald.Ehler@novascotia.ca	Don	Ehler	Province of Nova Scotia	Remote
Subgroup Repairs and Alterations	jonathan_ferreira@hsb.com	Jon	Ferreira	Hartford Steam Boiler Inspection & Insurance Company	In-person
Subgroup Repairs and Alterations	steve.frazier@seattle.gov	Steve	Frazier	City of Seattle	Remote
Subgroup Repairs and Alterations	ggalanes@diamondtechnicalservices.com	George	Galanes	DTS Inc.	In-person
Subgroup Repairs and Alterations	philip_gilston@hsb.com	Philip	Gilston	Hartford Steam Boiler	In-person
Subgroup Repairs and Alterations	ggoossens@nationalboard.org	Greg	Goossens	NBBI	In-person
Subgroup Repairs and Alterations	jhayes@ccsboiler.com	John	Hayes	Combustion & Control Solutions, Inc.	Remote
Subgroup Repairs and Alterations	thellman@nationalboard.org	Terrence	Hellman	National Board	In-person
Subgroup Repairs and Alterations	adam.henson@csb.gov	Adam	Henson	U.S. Chemical Safety Board	In-person
Subgroup Repairs and Alterations	sara@vikingvessel.com	Marshall	Hicks	Viking Vessel Services LLC	In-person
Subgroup Repairs and Alterations	marshall@vikingvessel.com	Marshall	Hicks	VIKING VESSEL SERVICES, LLC	Remote
Subgroup Repairs and Alterations	CHOPKINS@SEATTLEBOILER.COM	Craig	Hopkins	Seattle Boiler Works, Inc.	In-person
Subgroup Repairs and Alterations	bhrubala@us.tuv.com	Bernie	Hrubala	TUV Rheinland	In-person
Subgroup Repairs and Alterations	aziz.khsassani@rbq.gouv.qc.ca	Aziz	Khsassani	Régie du Bâtiment du Québec	In-person
Subgroup Repairs and Alterations	don.kinney@labor.nc.gov	Don	Kinney	North Carolina Boiler Safety Bureau	In-person
Subgroup Repairs and Alterations	tlebeau@southernco.com	Tim	LeBeau	Southern Company Services	Remote
Subgroup Repairs and Alterations	steven.lombardo@ge.com	Steve	Lombardo	GE Vernova	In-person
Subgroup Repairs and Alterations	dan@isbsservices.com	Daniel	Lynch	ISBS	Remote
Subgroup Repairs and Alterations	stacey.marks@bureauveritas.com	Stacey	Marks	Bureau Veritas	Remote
Subgroup Repairs and Alterations	Timothy.McBee@tuvsud.com	Timothy	McBee	ARISE	In-person
Subgroup Repairs and Alterations	ctmcdaris@gmail.com	Charles	McDaris	GE Steam Power	Remote
Subgroup Repairs and Alterations	robert.b.mcguire@ge.com	Robert	McGuire	GE Steam Power Boilers	Remote
Subgroup Repairs and Alterations	teresa_melfi@lincolnelectric.com	Teresa	Melfi	Lincoln Electric	In-person
Subgroup Repairs and Alterations	rlmiletta@babcock.com	Ray	Miletti	Babcock & Wilcox	In-person
Subgroup Repairs and Alterations	linnw@supernet.com	Linn	Moedinger	Strasburg RR	Remote
Subgroup Repairs and Alterations	kathymoore@joemoorecompany.com	Kathy	Moore	Joe Moore & Company	In-person
Subgroup Repairs and Alterations	morelock@eastman.com	Brian	Morelock	Eastman Chemical Company - Retiree	Remote
Subgroup Repairs and Alterations	terence.paige1@ge.com	Terence	Paige	General Electric	Remote
Subgroup Repairs and Alterations	lponce@nationalboard.org	Luis	Ponce	National Board of Boiler and Pressure Vessel Inspectors	In-person
Subgroup Repairs and Alterations	pyndinca@airproducts.com	Craig Allen	Pyndinski	APCI	Remote
Subgroup Repairs and Alterations	michael@spartan-mech.com	Michael	Quisenberry	Spartan Boiler & Mechanical	In-person
Subgroup Repairs and Alterations	bschafer@aep.com	Ben	Schafer	AEP	In-person
Subgroup Repairs and Alterations	mschaser@e2g.com	Matt	Schaser	The Equity Engineering Group, Inc.	In-person
Subgroup Repairs and Alterations	gscibner@nationalboard.org	Gary	Scribner	NBBI	In-person
Subgroup Repairs and Alterations	tsseime@nd.gov	Trevor	Seime	State of North Dakota	In-person
Subgroup Repairs and Alterations	jsekely@comcast.net	James	Sekely	Welding Services, Inc.	Remote
Subgroup Repairs and Alterations	boilersandpressurevessels9@gmail.com	M. A.	SHAH	AIS	Remote
Subgroup Repairs and Alterations	paul.shanks@onecis.com	Paul	Shanks	BVI&I	Remote
Subgroup Repairs and Alterations	jsiefert@epri.com	John	Siefert	Electric Power Research Institute	In-person
Subgroup Repairs and Alterations	tsimmons@boilermakers.org	Tim	Simmons	International Brotherhood of Boilermakers	In-person
Subgroup Repairs and Alterations	sean.skiles@fulton-pacific.com	Sean	Skiles	Fulton Equipment Pacific	In-person
Subgroup Repairs and Alterations	Waltersperko@icloud.com	Walter	Sperko	Sperko Engineering	In-person
Subgroup Repairs and Alterations	walt@sperkoengineering.com	Walter	Sperko	Sperko Engineering Services, Inc	In-person
Subgroup Repairs and Alterations	raymond_spuhl@hsb.com	Raymond	Spuhl	Hartford Steam Boiler Inspection & Insurance Company	In-person
Subgroup Repairs and Alterations	A.thompson@dencoindustrial.com	James	Thompson	DenCo Industrial	Remote
Subgroup Repairs and Alterations	mtoth@boisctotraininggroup.com	Marty	Toth	ECS Consulting, LLC	In-person
Subgroup Repairs and Alterations	triplett@ornl.gov	Andrew	Triplett	UT-Battelle, LLC	In-person
Subgroup Repairs and Alterations	Rob.troutt@tdlr.Texas.gov	Rob	Troutt	TDLR	In-person
Subgroup Repairs and Alterations	robert_underwood@hsb.com	Robert	Underwood	Hartford Steam Boiler	In-person
Subgroup Repairs and Alterations	jaga4021@hotmail.com	Jagadheesan	Vellingiri Muthukumaraswamy	APAVE SA	Remote
Subgroup Repairs and Alterations	mark.vogt@vistracorp.com	Mark	Vogt	Luminant	In-person
Subgroup Repairs and Alterations	melissa.wadkinson@fulton.com	Melissa	Wadkinson	Fulton	In-person
Subgroup Repairs and Alterations	thomas.white@nrg.com	Tom	White	NRG Energy	In-person
Subgroup Repairs and Alterations	michaeltwinters@gmail.com	Michael	Winters	Boiler & Property Consulting	In-person
Subgroup Repairs and Alterations	John@vikingvessel.com	John		Viking Vessel Services LLC	In-person
		Jamie	Walker		
		Frank	Johnson		
		Eric	Cutlip		
		Rick	Valdez		
		Paul	Lentzer		
		John	Burpee		

NBIC Committee Meeting

ASME BPV VIII Pressure Vessels Standards Committee
ASME/API Joint Fitness for Service Standards Committee
Liaison Report

J. Sowinski
The Equity Engineering Group, Inc.

January 8-11, 2024

Omni La Mansion Del Rio Hotel

San Antonio, TX

ASME/API FFSJC

- Meeting No. 45
 - Embassy Suites Chicago Downtown Magnificent Mile, Chicago, IL
 - October 23-24, 2023
- Membership of FFSJC
 - Brian Macejko, Chair
 - Antonio Seijas, Vice Chair
- FFS Example Problem Manual
 - ASME PTB agreement between ASME and API was finalized
 - API 579-2/ASME FFS-2 will next be published as API/ASME PTB-14-2023
 - In final steps for publication ~ 1Q-2024

ASME/API FFSJC

- Errata
 - Published on the ASME/API Joint Committee on Fitness-For-Service Website on 07/20/2023, under Publication Information
 - <http://go.asme.org/ffscommittee>
- Publication Cycle for API 579-1/ASME FFS-1
 - FFSJC targeting 2025 Edition
 - Vision of 3-year publication cycle as Parts become more stable

ASME/API FFSJC

- Part 1: Introduction
- Part 2: FFS Engineering Assessments
- Part 3: Brittle Fracture
- Part 4: General Metal Loss
- Part 5: Local Metal Loss
- Part 6: Pitting Corrosion
- Part 7: Hydrogen Blisters and Hydrogen Damage Associated with HIC and SOHIC
- Part 8: Weld Misalignment and Shell Distortions
- Part 9: Crack-Like Flaws
- Part 10: Components Operating in the Creep Regime
- Part 11: Fire Damage
- Part 12: Dents, Gouges, and Dent-Gouge Combinations
- Part 13: Laminations
- Part 14: Fatigue damage

ASME/API FFSJC

- Current Worklist for 2025 Edition
 - Part 2 Fitness-for-Service Engineering Assessment Procedures
 - Update Annex 2D for load case combination factors (Stress Analysis Overview of FFS Assessments)
 - Derived from ASCE 7-22
 - Replicated in ASME VIII-2, Part 4 Design-by-Rule and Part 5 Design-by-Analysis
 - New Annex 2G for NDE/NDT guidance for FFS applications (currently under ballot)
 - Part 3 Brittle Fracture
 - New Annex 3B to provide alternative procedure for establishing MAT limits using a fracture mechanics approach (currently under ballot)
 - Part 4 General Metal Loss
 - Review of Component Type/Class Designations, inclusion of RSF_a for Type B Class 2
 - Development of Air Cooler Header Box thinning assessments

ASME/API FFSJC

- Current Worklist for 2025 Edition
 - Part 5 Local Metal Loss
 - Investigate changes to spacing criterion to major structural discontinuity, L_{msd}
 - Open inquiry into AUT/ILI thickness scan data guidance
 - Part 7 Hydrogen Blisters, HIC and SOHIC
 - Update guidance on damage characterization
 - Part 8 Weld Misalignment and Shell Distortions
 - Investigate development of Level 2 Bulging rules

ASME/API FFSJC

- Current Worklist for 2025 Edition
 - Part 9 Crack-Like Flaws
 - Update Annex 9B Stress Intensity Solutions
 - Update Annex 9C Reference Stress Solutions
 - Investigate updates to Annex 9D Weld Residual Stress Solutions
 - Enhance guidance and Clarity
 - Annex 9H Constraint Effects for Surface Flaws in Carbon and Low Alloy steels in the Ductile-Brittle Transition Region
 - Annex 9I Alternative Estimate of Stress Intensity Factors for FFS Assessments in the Ductile-Brittle Transition Region
 - Annex 9J Determination of the MAT using a Level 2 Fracture Mechanics Approach
 - Part 10 Components Operating in the Creep Regime
 - Update the creep-buckling rules

ASME/API FFSJC

- Other On-Going Activities
 - New Parts
 - Part 15, Assessment on Piping Vibration, currently under ballot
 - High Temperature Hydrogen Attack, under development
 - Fiber-Reinforced Polymers, under development
 - Overpressure, under development
 - New Task Groups to review Standard for opportunities for improvement
 - Atmospheric Storage Tanks
 - Pipelines
 - Investigate opportunities for
 - Advanced FFS procedures for bolted joints
 - Relaxation of structural discontinuity spacing for some Type B/C components
- Next FFSJC Meeting: May 20-21, 2024, St. Louis, MO

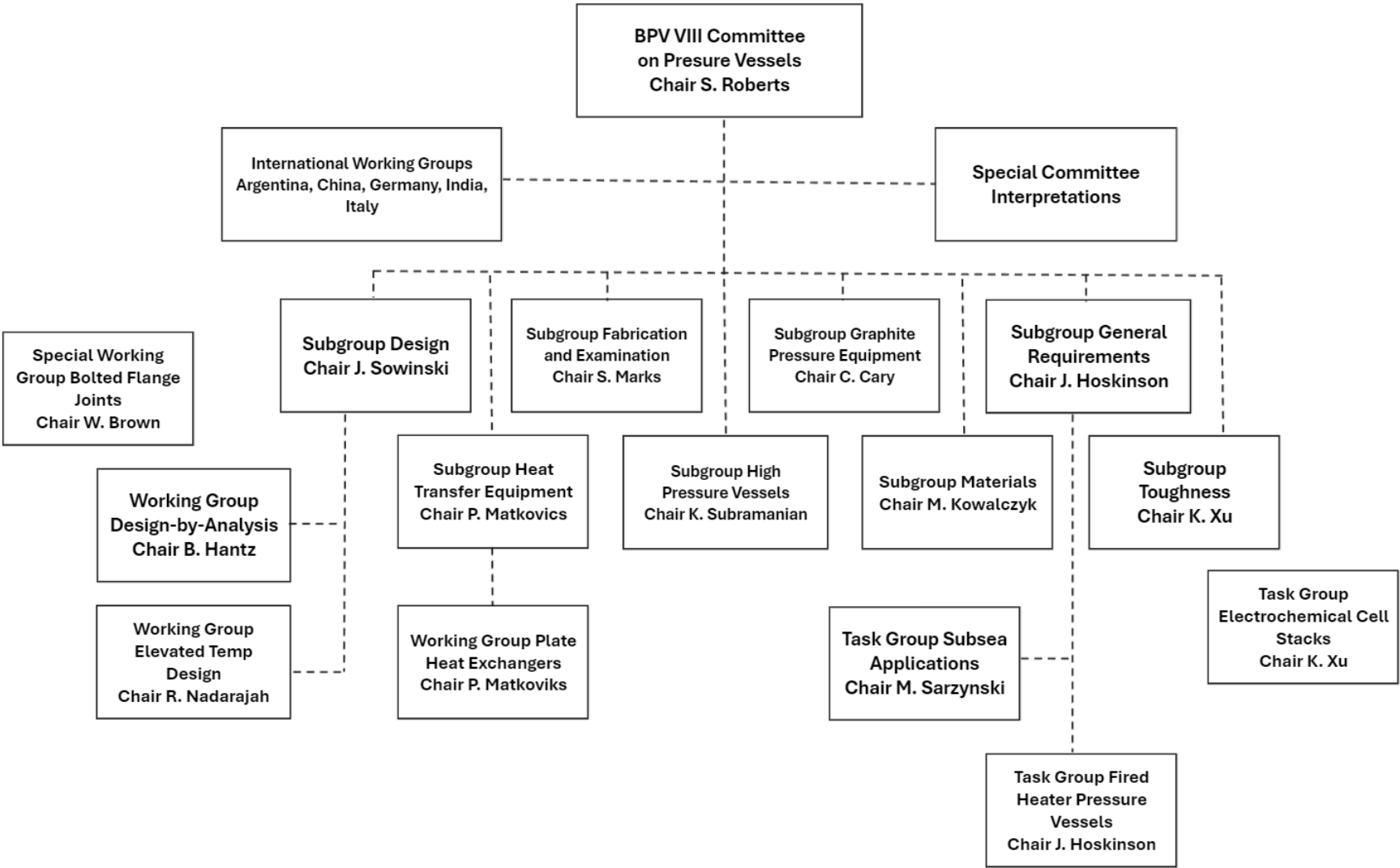
ASME BPV VIII PVSC

- November Meeting
 - The Westin Galleria and Westin Oaks Houston – Houston, TX
 - November 12-17, 2023
- Boiler Code Week - Meeting Structure
 - Virtual Winter/Summer meetings*
 - In-Person Spring/Fall meetings
 - * BPV VIII continues to meet in-person for all four meetings
 - Next meeting February 4-9, 2024 for most – however some subgroups meet at alternate days/times
 - BPV VIII will meet February 5-8, 2024 in Houston, TX (Shell Facility)

ASME BPV VIII PVSC

- BPV VIII Structure
 - BPV VIII Pressure Vessel Standards Committee
 - Subgroups
 - Special Work Groups
 - Working Groups
 - Task Groups
 - International Working Groups
 - Special Committees

ASME BPV VIII PVSC



ASME BPV VIII PVSC

- BPV VIII Initiatives – Reshape Project
 - Reimagine what ASME VIII-1 will look like – target audience
 - Thought is to simplify - NOT REPLACE
 - 2021 Survey review
 - Fundamental design rules to remain – cylinders, cones, heads, nozzles
 - Introduce load case combinations or limit load applicability
 - Limits of Pressure, Temperature, Materials
 - Disclaimer – No decisions have been made by the Committee to any of these ideas

ASME BPV VIII PVSC

- BPV VIII Initiatives – Reshape Project
 - Common Rules - Task associated with the ASME VIII-2 Re-write in 2007
 - ASME VIII-1 design rules referenced to ASME VIII-2
 - Part UHX, Rules for Shell and Tube Heat Exchangers (ASME VIII-2, Part 4.18)
 - MA 26, Bellows Expansion Joints (ASME VIII-2, Part 4.19)
 - MA 2, Rules for Bolted Flange Connections (ASME VIII-2, Part 4.16)
 - MA 9, Jacketed Vessels (ASME VIII-2, Part 4.11)
 - MA 13, Vessels of Noncircular Cross Section (ASME VIII-2, Part 4.12)
 - MA 14, Integral Flat Heads with Central Opening (ASME VIII-2, Part 4.6)
 - MA 24, Design Rules for Clamp Connections (ASME VIII-2, Part 4.17)
 - NMA EE, Half-Pipe Jackets (ASME VIII-2, Part 4.11)
 - NMA FF, Guide for the Design of Quick-Actuating Closures (ASME VIII-2, Part 4.8)

ASME BPV VIII PVSC

- BPV VIII Initiatives – Reshape Project
 - Clarity - address “problem” paragraphs to be re-written (readability)
 - SGD
 - UG-16 Design General
 - UG-20 Design Temperature
 - UW-16 Minimum Requirements for Attachment Welds at Openings
 - SGGR
 - UG-99, UG-100 Hydrostatic / Pneumatic Pressure Test
 - UW-11, UW-12 Radiographic and Ultrasonic Examination / Joint Efficiencies
 - SGFE
 - UW-40 Procedures for Postweld Heat Treatment
 - UCS-56 Requirements for Postweld Heat Treatment
 - SGT
 - Low Temperature Operation
 - UCS-66 Materials, UCS-67 Impact Tests of Weld Procedures, UCS-68 Design

ASME BPV VIII PVSC

- SGD: In-Progress

- ASME VIII-1 UG-44(b), ASME VIII-2 Part 4.16.12 Evaluation of External Forces and Moments for Flanged Joints with Standard Flanges
 - Code Case 2901 was revised - Committee Approved
- Update of load case combinations to coincide with ASCE 7-22
- Revising allowable compressive stress equations due to bending
- Revising and clarifying hydrostatic/pneumatic test pressure guidance in ASME VIII-1 and ASME VIII-2

ASME BPV VIII PVSC

- WG-DBA: In-Progress
 - Update Part 5 Design-by-Analysis methodologies to coincide with API 579-1/ASME FFS-1, Annex 2D
 - Update Part 3 Annex 3F fatigue assessments to coincide with API 579-1/ASME FFS-1, Annex 14B
- WG-BFJ: In-Progress
 - Removal of nubbins from ASME VIII-1 and ASME VIII-2 design of flanges
 - Eliminate “Optional Flanges” from ASME VIII-1
 - Include welded slip-on flange equations to ASME VIII-1 and ASME VIII-2
 - Updated equations for integral and loose flange factors F , F_L , V , V_L

ASME BPV VIII PVSC

- SGR: In-Progress
 - Scope: U-1(c)(2)(i) – looking to eliminate the exemption of vessels having an inside diameter, width, height, or cross section diagonal not exceeding 6 in. (152 mm), with no limitation on length of vessel or pressure
 - Appendix 47 Requirements for Pressure Vessel Designers - under revision
 - Multiple requests for interpretation
 - Confusion amongst Team Leaders, Manufacturers, AIAs, and Users
 - UG-99/UG-100 - Hydrostatic/Pneumatic Test additional requirements to address AIAs reporting increasing number of “Near Misses”

ASME BPV VIII PVSC

- SGT: In-Progress
 - Maintaining as-forged SA-105 flange exemption temperature at 0°F and SA-105 flange exemption temperature at -20°F if produced to fine grain and heat treated after forging for impact test exemption
 - Issued response memo to B31 committee suggesting an industry wide task group to re-evaluate
 - Presentation provided to update SGT on the proposed change in CSA B51 to address toughness for carbon low alloy steels
 - All carbon steel pipe, fittings and forgings for pressure vessels, listed in the applicable code of construction, shall meet the Charpy V Notch impact testing requirements and acceptance criteria of the applicable code of construction;
 - Test specimens shall have a minimum average Charpy V Notch impact energy of 18 J (13 ft lbf), with no single test value being less than 14J (10 ft lbf). The test temperature shall be the lower of 0 C or the minimum design metal temperature.



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

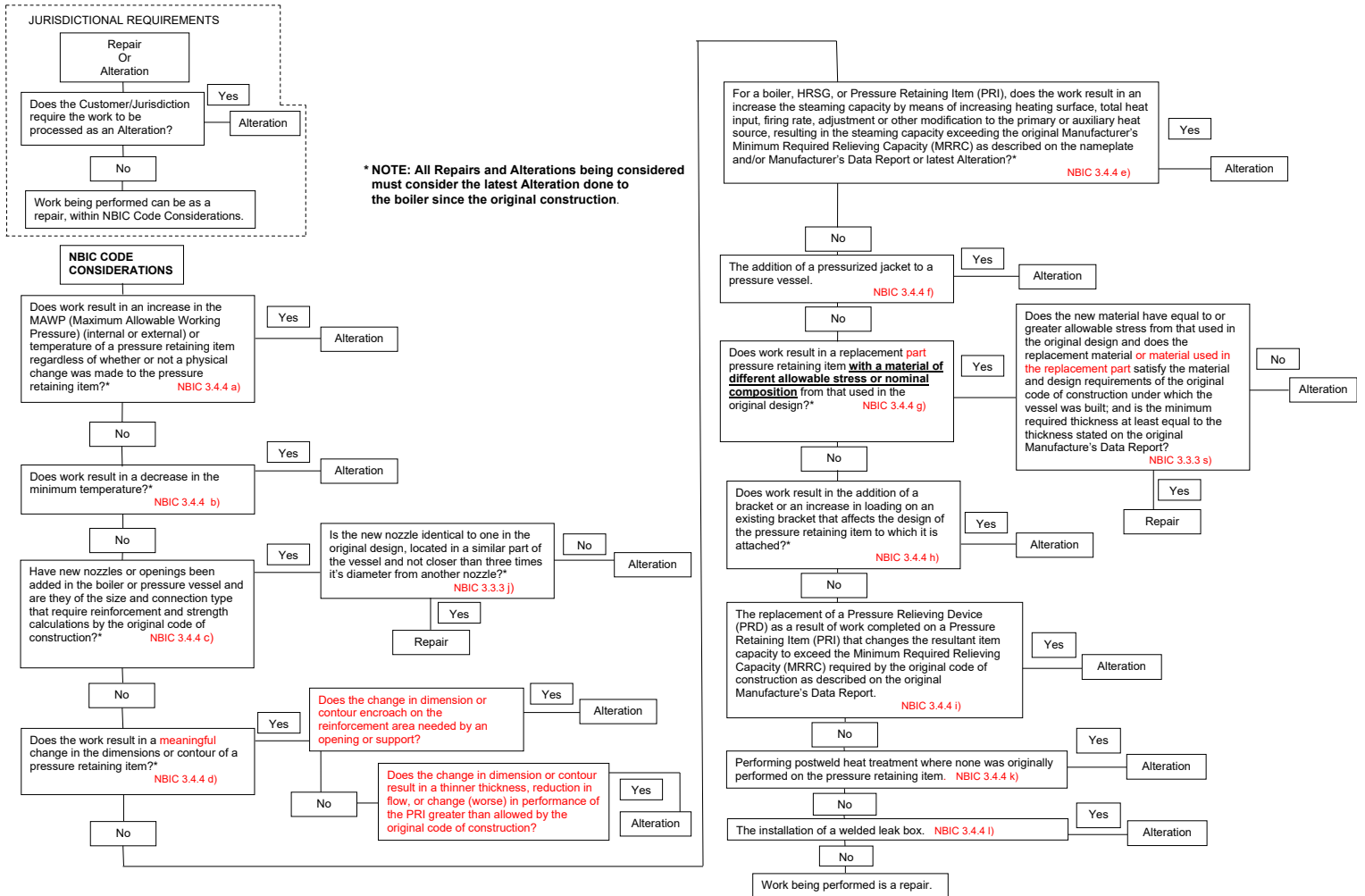
PROPOSED REVISION OR ADDITION

Item No. A 21-12	
Subject/Title Revision to modify Term 'Alteration' 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, pabecker@babcock.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 User experience and clarify definition of 'Alteration'. Updated 'problematic' example lists to eliminate 'conflicting examples'.	
Existing Text	Proposed 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>(21) 3.2.1 MATERIAL REQUIREMENTS FOR REPAIRS AND ALTERATIONS</p>	<p style="text-align: center;">PART 3, SECTION 3 REPAIRS AND ALTERATIONS — REQUIREMENTS FOR REPAIRS AND ALTERATIONS</p> <p><u>3.0 INTRODUCTION</u></p> <p><u>This Section provides information on the requirements for repairs and alterations to pressure retaining items. Information on how to classify, perform, verify, and document acceptable repair and alteration activities may be found throughout Part 3 Sections and Supplements (Refer to the Table of Contents for detail on the location of relevant information). It is the intent that this Section 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 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, Section 6.</p>

SUPPLEMENT X CLASSIFYING REPAIRS AND ALTERATIONS

SX.1 SCOPE

**FIGURE SX.1
DECISION TREE (LOGIC DIAGRAM) FOR DETERMINING REPAIR OR ALTERATION ACTIVITY CLASSIFICATION**



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

- a) Using the instructions found in Table S9.3 of Supplement 9, initial preparation of Form R-2, including gathering and attaching supporting documentation, shall be the responsibility of the “R” Certificate Holder responsible for the design portion of the alteration. The design organization shall complete and sign the “Design Certification” section of the Form R-2. An Inspector shall indicate acceptance of the design by signing the “Certificate of Design Change Review” section of the Form R-2.
- a)b) “R” Certificate Holders whose scope is “Design Only” can perform code calculations for re-rating and alterations as defined in this Part but are prohibited from performing physical work (construction work) to the pressure retaining item except for the “R” Stamping, NDE, and/or final pressure testing; as applicable, provided the controls are included in the Quality System. “R” Certificate Holders who perform physical the above work in the field shall have the scope for field activities on their “R” Certificate of Authorization.
- c) The information describing an alteration to a pressure-retaining item shall be identified on Form R-2 with a complete description of the scope of work for physical or non-physical changes.
1. ~~When the scope of work represents a change that will increase the Minimum Required Relieving Capacity (MRRC) of a pressure-retaining item, such as a change in heating surface, Maximum Designed Steaming Capacity (MDSC), or BTU/hr (W) heating capacity, the new MRRC shall be documented on Form R-2 and indicated on the appropriate nameplate of NBIC Part 3, Figure 5.7.5-b or NBIC Part 3, Figure 5.7.5-c.~~
- d) Final preparation of Form R-2, including gathering and attaching supporting reports, shall be the responsibility of the “R” Certificate Holder that performed the construction portion of the alteration. The construction organization shall complete the Form R-2 provided by the design organization, including the “Construction Certification” section of the form. An Inspector shall indicate that the work complies with the applicable requirements of this code by completing and signing the “Certificate of Inspection” section of the form. ~~When no construction work is performed (e.g., a re-rating with no physical changes), the “R” Certificate Holder responsible for the design shall prepare the Form R-2, including gathering and attaching of supporting documentation.~~
- b)e) The Construction Certificate section of the form shall only be completed when construction work has been performed.
- e)f) The following shall be attached to and become a part of completed Form R-2:
1. For ASME boilers and pressure vessels, a copy of the original Manufacturer’s Data Report, when available.
 2. Form R-3, Report of Parts Fabricated by Welding, Manufacturer’s Partial Data Reports, or Certificates of Compliance, if applicable; and
 3. For other than ASME, the manufacturer’s reports (i.e., reports required by the original code of construction, etc.), when available.

Item 22-41 – Addressing NB-415 Changes to Organization

Existing Text	Proposed Text
<p>1.5.1 d) Quality System Control</p> <p>The Quality System shall define how revisions of individual sections, exhibits or documents will be identified, and how distribution and retrieval will be achieved to ensure only the latest accepted revisions are available for use. In addition, the following shall be documented:</p> <p>1) The title of the individual responsible for the preparation and approval of the Quality System including review of code editions, standards, and jurisdictional requirements.</p> <p>2) Acceptance from the Authorized Inspection Agency prior to issuance and implementation of the Quality System.</p>	<p>1.5.1 d) Quality System Control</p> <p>The Quality System shall define how revisions of individual sections, exhibits or documents will be identified, and how distribution and retrieval will be achieved to ensure only the latest accepted revisions are available for use. In addition, the following shall be documented:</p> <p>1) The title of the individual responsible for the preparation and approval of the Quality System including review of code editions, standards, and jurisdictional requirements.</p> <p>2) Acceptance from the Authorized Inspection Agency prior to issuance and implementation of the Quality System.</p> <p><u>3) The process of handling changes to scope, primary contact information (company's primary contact name, phone, or email), ownership, or their Inspection Agreement with an AIA, and.</u></p> <p><u>a. shallThis process shall include notification in writing to the National Board Technical Department – Accreditation.</u></p>

Item 22-41 – Addressing NB-415 Handling Multiple Stamps and Return of Stamps

Existing Text	Proposed Text
<p>1.5.1 q) Control of the “R” Symbol Stamp</p> <p>The Quality System shall provide adequate control of the “R” Symbol Stamp. In addition, the Quality System shall make provisions for Inspector acceptance for the application of the “R” Symbol Stamp to the pressure retaining item or nameplate.</p> <p>The accepted abbreviation of the “R” Certificate Holder’s name shall be included in the manual.</p>	<p>1.5.1 q) Control of the “R” Symbol Stamp</p> <p>The Quality System shall provide adequate control of the “R” Symbol Stamp. In addition:</p> <ol style="list-style-type: none"> 1) The Quality System shall make provisions for Inspector acceptance for the application of the “R” Symbol Stamp to the pressure retaining item or nameplate; 2) The accepted abbreviation of the “R” Certificate Holder’s name shall be included in the manual; <u>3) If more than one “R” symbol stamp is obtained and maintained by the organization, the use and control of multiple stamps shall be included in the manual;</u> <u>4) The manual shall contain provisions and timeframe for the “R” symbol stamp(s) to be returned to the National Board if the organization discontinues its use of the “R” Certificate of Authorization, if it no longer holds an Inspection Agreement with an AIA (if applicable), or if the Certificate of Authorization has expired and a new certificate has not been requested by the organization.</u>



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

PROPOSED REVISION OR ADDITION

Item No. A 23-13 Rev 05	
Subject/Title Referencing for Weld Metal, Filler Metal etc.	
NBIC Location	
Project Manager and Task Group P Gilston (PM), J. Siefert, W. Sperko, M. Vance, T Melfi, F Johnson	
Source (Name/email) January 2023, Sub-Committee Discussion	
Statement of Need Within Part 3, welding consumables are referred to in several different ways e.g., filler metal(s) (52 times), weld metal (11 times), consumable (14 times), welding electrode (once) etc. This item is to review these references, create definitions and bring consistency for reference descriptions.	
Background Information When discussing weld metal, references can be made to the weld consumable itself, or the deposited weld metal. Often we describe the 'nominal composition' for the weld, this is normally based on the actual weld metal deposited in a weld joint. Various factors can influence the chemistry of a deposited weld metal, including, but not limited to dilution with the base metal, protective fluxes, shielding gas etc.	
Revision 03 Notes Added "consumable inserts" to the definition of "Weld Consumable" per comment from Mr. McBee (SG R&A). Added "rods" to the definition of "Weld Consumable" per comment from Mr. Schaefer (SG R&A). Added ", as defined in ASME Section IX, to the definition of "Weld Consumable" per comment from Mr. Nutter (SG PRD). Added new definition for "Heat-Affected Zone (HAZ)" per comments from Mr. Marek and Mr. Nutter (SG PRD). Definition of "Weld Metal" revised per comment from Mr. Nutter (SG PRD). Definition of "Base Metal" added per comment from Mr. Nutter (SG PRD). The term "or soldering" deleted from definition of "Filler Metal" per comment from Mr. Nutter (SG PRD). Moved the reference to "autogenous weld" to the definition for "Weld" per Mr. Sperko's comment. Revision 04 notes. Editorial changes to "Weld Consumable". "to produce a weld" deleted from the end of "Weld Metal"	
Existing Text None	Proposed Text 9.1 DEFINITIONS Weld - A weld consists of weld metal and heat-affected zones (HAZ). <u>A weld may be made with or without the</u>

addition of filler metal. When no filler metal is added this is known as an autogenous weld.

Weld Metal - Metal resulting from the melting together of filler metal and base metal or the melting of base metal only in a fusion weld consisting of that portion of the base metal and filler metal melted during welding. When no filler metal is added this is known as an autogenous weld.

Filler Metal - The metal that is added during a welding, or brazing or soldering operation.

Weld Consumable - Electrodes, rods, wires, and fluxes, and consumable inserts, as defined in ASME Section IX, that are melted during a welding operation.

Heat-Affected Zone (HAZ) - that portion of the base metal which has not been melted but whose mechanical properties or microstructures have been altered by the heat of welding or cutting.

Base Metal - The metal being welded, brazed, or cut.

VOTE							
Committee	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

TEW 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.

4.4.1 TEST OR EXAMINATION METHODS APPLICABLE TO REPAIRS

Based on the nature and scope of the repair activity, one or a combination of the following examination and test methods shall be applied to repairs and replacement parts used in repairs.

4.4.2 TEST OR EXAMINATION METHODS APPLICABLE TO ALTERATIONS

Based on the nature and scope of the alterations activity, one or a combination of the following examination and test methods shall be applied to alterations (unless waived in accordance with 3.4.1 d) of this Part) and replacement parts used in alterations.



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/

Existing Text

3.3.1 DEFECT REPAIRS

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.

Proposed Text

3.3.1 DEFECT REPAIRS

The owner or user of a pressure-retaining item is responsible for determining whether or not a condition assessment is required to determine the cause, extent, and likelihood of defect recurrence, depending on the complexity of the defect. When such a condition assessment is deemed necessary, the owner or user of the pressure-retaining item is responsible for selecting and applying the condition assessment methodology that is performed.

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.

The owner or user is responsible for addressing all defects found during the condition assessment. For repairs of pressure-retaining items without complete removal of the defect, see NBIC Part 3, Section 3.3.4.8.

VOTE:							
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

A23-39 Abstain

Marty Toth <mtoth@boiscotraininggroup.com>

Tue 1/9/2024 3:42 PM

To:Terrence Hellman <THellman@nationalboard.org>

A23-39

Though there may be a need to revise 3.3.1, simply putting it back on the “owner or user” appears to me to be a way for the NBIC to pass the responsibility on and to satisfy the findings by the CSB. The enforcement of this is not practicable in a real-life situation.



Marty Toth

Principal | Consultant | Trainer

ECS Consulting LLC

and the Boisco Training Group

Mobile 615.504.9064

Email mtoth@boiscotraininggroup.com

Web www.boiscotraininggroup.com

P.O. Box 878, Nolensville, TN 37135



A23-39

Kathy Moore <kathymoore@joemoorecompany.com>

Tue 1/9/2024 3:24 PM

To: Terrence Hellman <THellman@nationalboard.org>

The reasoning for my "no" vote is as following:

The first 2 paragraphs should be in Part 2, not Part 3.

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Kathy Moore

Joe Moore & Company, Inc.

PH: (919) 832-1665



THE NATIONAL BOARD
OF BOILER AND PRESSURE VESSEL INSPECTORS

PROPOSED REVISION OR ADDITION

Item No. A 23-69 Rev 03	
Subject/Title Temporary Location	
NBIC Location	
Project Manager and Task Group Ray Miletti (PM), Eric Cutlip, Marty Toth, Jamie Walker	
Source (Name/email)	
Statement of Need "Field" site under the current definition could be multiple rented or leased spaces used for repairs/alterations, where there is no single or specific customer or job, but rather the locations(s) are used for conducting repair/alteration activities by personnel employed by the Certificate Holder on a continual basis.	
Background Information NB-415 has been revised and issued. Section 9.0 has added definitions for Shop Location, Temporary Location and Field Site. Shop Location and Field Site duplicate definitions already in Part 3, Temporary Location is a new definition. Further Footnote 1 of section 2.2 in NB-415 states: 'A separate application is required for temporary locations (See Section 9.0 of this procedure) as permitted by National Board internal policies.', and Section 6.4 requires requests for the use of temporary locations to be submitted to NB for approval, further the use of temporary locations not approved is prohibited. This action proposes to revise the entries for the definitions of Field and Shop in Section 9.1 and add a new entry for Temporary Location. The definitions will reference NB-415 Section 9. This action will require balloting for Parts 1, 2, 3 and 4. Rev 02, replaced proposed words of "See NB-415, Accreditation of "R" Repair Organizations, Section 9.0." with the words as published in NB-415 Rev	
Existing Text 9.1 DEFINITIONS Field - A temporary location, under the control of the Certificate Holder, that is used for repairs and/or alterations to pressure-retaining items at an address different from that shown on the Certificate Holder's <i>Certificate of Authorization</i> . Shop - A permanent location, the address that is shown on the <i>Certificate of Authorization</i> , from which a Certificate Holder controls the repair and/or alteration of pressure-retaining items.	Proposed Text 9.1 DEFINITIONS Field Site - A temporary location, under the control of the Certificate Holder, that is used for repairs and/or alterations to <u>where a specific</u> pressure-retaining item(s) <u>is installed at an address different from that shown on</u> the <u>and is being repaired or altered under the control of the</u> Certificate Holder's Certificate of Authorization . Shop Location - A permanent location facility (e.g., shop, office, etc.), the whose physical address that <u>is</u> shown on the <i>Certificate of Authorization</i> , <u>and</u> from which a Certificate Holder controls the repair and/or alteration of pressure-retaining items.

Temporary Location – A location which is both different from the physical address shown on the Certificate of Authorization and a Field Site as defined in this section which is utilized to perform repair/alteration activities for a specific contracted period to extend Code shop capacity and/or support field site activities. Each temporary location shall be authorized by the National Board and shall not be utilized beyond the period specified nor outside the scope as listed on the Certificate of Authorization. For example, if a Certificate Holder has a contract with another business or utility for ongoing work and sets up a shop to perform NBIC activities at the location specified in the contract or maintenance agreement, such location would be considered a temporary location.

VOTE							
Committee	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

SUPPLEMENT 6

REPAIR, ALTERATION, AND MODIFICATION OF DOT TRANSPORT (CARGO) TANKS

S6.1 SCOPE

This supplement provides requirements and guidelines for repairs, alterations, or modifications to DOT Transport Tanks used for the transportation of dangerous goods via highway, rail, air, or water.

S6.2 DEFINITIONS

The definitions specified in NBIC Part 3, Section 9, *Glossary*, shall be used in conjunction with those specified in NBIC Part 2, S6.17. Where conflicts between definitions exist, those identified in NBIC Part 2, S6.17 shall take precedence.

S6.3 CONSTRUCTION STANDARDS

When the standard governing the original construction is the ASME Code or other regulations of the Competent Authority, repairs, alterations, or modifications shall conform, insofar as possible, to the edition of the construction standard or specification most applicable to the work. Where this is not possible or practicable, it is permissible to use other codes, standards or specifications, including the ASME Code provided the "R" Certificate Holder has the concurrence of the Inspector and if required, the Competent Authority.

S6.4 ACCREDITATION AND REGISTRATION

Organizations performing repairs, alterations, or modifications shall be accredited in accordance with the National Board "R" Accreditation Program. In addition repair organizations performing repairs, alterations, or modifications to transport tanks shall be registered with DOT as required by 49 CFR Part 180.

S6.5 AUTHORIZATION

The Inspector's authorization to perform a repair, alteration, or modification shall be obtained prior to initiation of the work to be performed on a transport tank. [When required by the Competent Authority the Inspector providing the authorization shall be a Registered Inspector.](#) Additional requirements are specified in NBIC Part 3, 1.3.1 and 1.3.2.

S6.6 INSPECTION

Inspection and certification shall be made by an Inspector holding an appropriate National Board Commission as required by NBIC Part 3, 1.3, [and when required by the Competent Authority the Inspector shall also be a Registered Inspector.](#)

S6.7 MODIFICATIONS

All modifications, as defined in NBIC Part 2, Supplement 6, to the pressure-retaining item shall meet the requirements of NBIC Part 3 for alterations and 49CFR180.413(b).

S6.8 DRAWINGS AND CALCULATIONS

- a) Design requirements for repairs, alterations and modifications shall comply with the requirements of NBIC Part 3, 3.2.4.

- b) As appropriate, drawings or instructions shall be prepared to describe the repair, alteration, or modification. Drawings shall include sufficient information to satisfactorily perform the activity.
- c) The design of alterations and modifications shall be completed by an organization experienced in the design portion of the standard used for the construction of the item and certified by a Design Certifying Engineer as defined in NBIC Part 2, S6.17. Design documents shall be completed prior to the start of any physical work and be available for review by the Inspector accepting the design.

S6.9 MATERIALS

The materials used in making repairs, alterations, or modifications shall conform to the original code of construction including the material specification requirements. Carbon or alloy steel having a carbon content of more than 0.35% (0.30% for ton tanks) shall not be welded unless permitted by the original code of construction. The "R" Certificate Holder is responsible for verifying the identification of existing materials from original data, drawings, or unit records and identification of the material to be installed. Materials that have previously been in service, as described in Part 3, 3.2.1 c), are not permitted for alterations or modifications of DOT Transport Tanks per 49 CFR Part 180. Additional material requirements are provided in NBIC Part 3, Section 3.

S6.10 REPLACEMENT PARTS

Replacement parts to be used in repairs, alterations, and modifications of DOT Transport Tanks shall comply with the requirements provided in NBIC Part 3, 3.2.2.

S6.11 WELDING

- a) Welding, including procedure specification qualification, performance qualification, qualification records, qualified personnel identification, continuity of qualified personnel, and process continuity records shall be in accordance with the requirements of the original code of construction used for the fabrication of the pressure retaining item and Part 3, Section 2.
- b) For hydrogen control when low alloy steel filler metals are used, the filler metal classification shall include an H4 supplemental diffusible hydrogen designator (maximum 4 ml [H₂]/100 g deposited metal) for each of the following welding processes:
 - 1) electrodes for shielded metal arc welding (SMAW) conforming to SFA-5.5;
 - 2) electrodes and fluxes for submerged arc welding (SAW) conforming to SFA-5.26;
 - 3) electrodes and rods for gas shielded metal arc welding (GMAW) conforming to SFA-5.28;
 - 4) electrodes for flux-cored arc welding (FCAW) conforming to SFA 5.29.
- c) Practices used for controlling storage and exposure of filler metals shall be those developed by the "R" Certificate Holder or those recommended by the filler metal manufacturer.

S6.12 HEAT TREATMENT

S6.12.1 PREHEATING

Preheating may be employed during use of a process to assist in completion of the joint. Preheating shall comply with the requirements in NBIC Part 3, 2.5.1.

S6.12.2 POSTWELD HEAT TREATMENT (PWHT)

Postweld heat treatment used in repairs, alterations, and modifications of DOT Transport Tanks shall comply with the requirements provided in NBIC Part 3, 2.5.2 and the Competent Authority.

S6.12.3 ALTERNATIVES TO POSTWELD HEAT TREATMENT

- a) Under certain conditions, postweld heat treatment in accordance with the original code of construction may be inadvisable or impractical. In such instances, alternative methods of postweld heat treatment or special welding methods in accordance with NBIC Part 3, 2.5.3, and acceptable to the Inspector and Competent Authority may be used.
- b) When the standard governing the original construction is the Code of Federal regulation for DOT/MC 331 transport tanks for propane, butane, anhydrous ammonia, and other DOT permitted commodities, and the tanks are made to the ASME Code, Section VIII, Division 1, Part UHT, repairs, alterations, or modifications shall conform insofar as possible, to the edition of the construction standard or specification most applicable to the work. Where this is not possible or practicable, it is permissible to use other codes, standards, or specifications provided the "R" Certificate Holder has the concurrence of the DOT. Shells and heads of MC 331 transport tanks were made from quenched and tempered alloy steel plate, SA517, Grade E (originally Code Case 1298) and Grade F (originally Code Case 1204) prior to 1994.
- c) The 1994 ASME Code Addenda revised UHT-5(b) to permit the joining of UHT materials to UCS or UHA materials in head and shell sections. Propane, butane, and anhydrous ammonia are the most common transported commodities and the shipper is required by DOT to comply with certain composition limitations. Propane and butane transported must have sufficiently low hydrogen sulfide content so as not to exceed the limitations for Classification One of the ASTM D1838-74 copper strip test, and the anhydrous ammonia transported must be inhibited with a minimum water content of 0.2% by weight. In addition, such transport tanks made for propane, butane, and anhydrous ammonia service must be postweld heat treated, unless specifically exempted by a DOT special permit that exempts PWHT.

S6.13 REPAIRS OF DEFECTS

- a) 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. This information shall be made available to the Inspector.
- b) For MC 330 and MC 331 transport tanks, when a repair is made to defects revealed by the wet fluorescent magnetic particle examination, including those repaired by grinding, the affected area of the transport tank must again be examined by the wet fluorescent magnetic particle method after hydrostatic testing to assure that all defects have been removed.

S6.14 NONDESTRUCTIVE EXAMINATION

- a) The nondestructive examination (NDE) requirements, including qualification of NDE personnel shall comply with the requirements in NBIC Part 3, 4.2 and the Competent Authority.

S6.15 MEASUREMENT, EXAMINATION, AND TEST EQUIPMENT

The calibration of pressure gages, measurement, examination, and test equipment, and documentation of calibration shall be performed, as required, by the applicable standard used for construction. This system shall be documented.

S6.16 PRESSURE TESTS FOR REPAIRS AND ALTERATIONS

The following requirements shall apply to all repairs, alterations, or modifications to DOT Transport Tank pressure-retaining items:

- a) The integrity of repairs alterations, modifications, and replacement parts used in repairs, alterations, or modifications shall be verified by a pressure test;
- b) Pressure testing shall be conducted in accordance with the original code of construction and the regulations of the Competent Authority.
- c) The "R" Certificate Holder is responsible for all activities relating to the pressure testing of repairs, alterations, or modifications;

S6.16.1 PRESSURE TEST METHODS APPLICABLE TO REPAIRS

- a) Liquid Pressure Test

Liquid pressure testing of repairs to DOT Transport Tanks shall comply with NBIC Part 3, 4.4.1(a) and the following requirements:

- 1) Liquid pressure tests shall be conducted in accordance with the requirements of the original code of construction and the regulations of the Competent Authority at pressures established in Table S6.16-a. When the original test pressure included consideration of corrosion allowance, the test pressure may be further adjusted based on the remaining corrosion allowance;

TABLE S6.16-a

TEST PRESSURE REQUIREMENTS FOR REPAIRS PER 49CFR180.413 and 49CFR180.407.

Transport Tank Specification	Test Pressure
MC 300, 301, 302, 303, 305, 306	The test pressure on the name plate or specification plate, 20.7 kPa (3 psig) or design pressure, whichever is greater.
MC 304, 307	The test pressure on the name plate or specification plate, 275.8 kPa (40 psig) or 1.5 times design pressure, whichever is greater.
MC 310, 311, 312	The test pressure on the name plate or specification plate, 20.7 kPa (3 psig) or 1.5 times design pressure, whichever is greater.
MC 330, 331	The test pressure on the name plate or specification plate, 1.5 times either MAWP or the re-rated pressure, whichever is applicable. DOT Transport Tanks constructed in accordance with Part UHT in Section VIII, Division 1 of the ASME Code shall be tested at a pressure at least twice the design pressure.
MC 338	The test pressure on the name plate or specification plate, 1.25 times either MAWP or the re-rated pressure, whichever is applicable.
DOT 406	The test pressure on the name plate or specification plate, 34.5 kPa (5 psig) or 1.5 times the MAWP, whichever is greater.
DOT 407	The test pressure on the name plate or specification plate, 275.8 kPa (40 psig) or 1.5 times the MAWP, whichever is greater.

DOT 412	The test pressure on the name plate or specification plate, 1.5 times the MAWP, whichever is greater.
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b) Pneumatic Test

A pneumatic test may be conducted in accordance with the requirements of the original code of construction and the regulations of the Competent Authority at pressures established in Table 6.16-a. Concurrence of the owner shall be obtained in addition to that of the Inspector and the Competent Authority, where required. Precautionary requirements of the original code of construction and NBIC Part 2, S6.13.6.1(c) shall be followed.

S6.16.2 PRESSURE TEST METHODS APPLICABLE TO ALTERATIONS AND MODIFICATIONS

a) Liquid Pressure Test

Liquid pressure testing of alterations and modifications to DOT Transport Tanks shall comply with NBIC Part 3, 4.4.2(a) and the following requirements:

- 1) Liquid pressure tests shall be conducted in accordance with the requirements of the original code of construction and the regulations of the Competent Authority at pressures established in Table S6.16-b. When the original test pressure included consideration of corrosion allowance, the test pressure may be further adjusted based on the remaining corrosion allowance;

TABLE S6.16-b
TEST PRESSURE REQUIREMENTS FOR ALTERATIONS AND MODIFICATIONS PER
49CFR180.413 AND THE APPLICABLE DOT TRANSPORT TANK SPECIFICATION

Transport Tank Specification	Test Pressure
MC 300, 301, 302, 303, 305, 306	The test pressure on the name plate or specification plate, 20.7 kPa (3 psig) or design pressure, whichever is greater.
MC 304, 307	The test pressure on the name plate or specification plate, 275.8 kPa (40 psig) or 1.5 times design pressure, whichever is greater.
MC 310, 311, 312	The test pressure on the name plate or specification plate, 20.7 kPa (3 psig) or 1.5 times design pressure, whichever is greater.
MC 330, 331	The test pressure on the name plate or specification plate, 1.5 times either MAWP or the re-rated pressure, whichever is applicable. DOT Transport Tanks constructed in accordance with Part UHT in Section VIII, Division I of the ASME Code shall be tested at a pressure at least twice the design pressure.
MC 338	The test pressure on the name plate or specification plate or 1.5 times the design pressure, plus static head of lading, plus 101.3 kPa (14.7 psi) if subjected to external vacuum. DOT Transport Tanks constructed in accordance with Part UHT in Section VIII, Division 1 of the ASME Code shall be tested at a pressure at least twice the design pressure.
DOT 406	The test pressure on the name plate or specification plate, 34.5 kPa (5 psig) or 1.5 times the MAWP, whichever is greater.
DOT 407	The test pressure on the name plate or specification plate, 275.8 kPa (40 psig) or 1.5 times the MAWP, whichever is greater.
DOT 412	The test pressure on the name plate or specification plate, 1.5 times the MAWP, whichever is greater.

c) Pneumatic Test

A pneumatic test may be conducted in accordance with the requirements of the original code of construction and the regulations of the Competent Authority at pressures established in Table 6.16-b. Concurrence of the owner shall be obtained in addition to that of the Inspector and the Competent Authority, where required. Precautionary requirements of the original code of construction and NBIC Part 2, S6.13.6.1(c) shall be followed.

S6.17 ACCEPTANCE INSPECTION

The Inspector making the acceptance inspection shall be the same Inspector who authorized the repairs, alterations, or modifications. Where this is not possible or practicable, another Inspector may perform the acceptance inspection; however, in all cases, the Inspector who performs the acceptance inspection shall be an employee of the same organization as the Inspector who authorized the repairs, alterations, or modifications.

S6.18 GENERAL STAMPING REQUIREMENTS

The stamping of or attaching of a nameplate to a pressure-retaining item shall indicate that the work was performed in accordance with the requirements of this code and any requirements of the Competent Authority. 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 the repair or the construction portion of the modification/alteration shall apply the stamping. For a re-rating where no physical changes are made to the pressure-retaining item, the "R" Certificate Holder responsible for the design shall apply the stamping. Requirements for stamping and nameplate information are shown in NBIC Part 3, Section 5.

S6.18.1 SPECIFIC "R" STAMPING AND NAMEPLATE REQUIREMENTS

The holder of a "R" *Certificate of Authorization* is required to affix a stamping or nameplate on the Transport Tank that indicates, the repair, alteration, or modification has been performed in accordance with the requirements of NBIC Part 3, Supplement 6 and the additional requirements of the code of construction. All repairs, alterations, and modifications, after acceptance by the Inspector, shall have the "R" Symbol affixed to the stamping or the nameplate. The stamping or nameplate information shall satisfy the requirements of NBIC Part 3, 5.7.

S6.18.2 REMOVAL OF ORIGINAL STAMPING OR NAMEPLATE

Removal of the original stamping or nameplate shall comply with the requirements of NBIC Part 3, 5.11.

S6.18.3 REPLACEMENT OF STAMPING OR NAMEPLATE

Replacement of indistinct stamping or lost, illegible, or detached nameplates shall comply with the requirements provided in NBIC Part 2, 5.2.

S6.19 FORM "R" REPORTS

S6.19.1 DOCUMENTATION OF FORM "R" REPORTS

Repairs, alterations, or modifications that have been performed in accordance with the NBIC shall be documented on Form R-1, *Report of Repair* or Form R-2, *Report of Alteration* as shown in NBIC Part 3, Section 5. Form R-4, *Report Supplementary Sheet*, shall be used to record additional data when space is insufficient on Form R-1 or R-2.

S6.19.2 PREPARATION OF FORM "R" REPORTS

Preparation of "R" Forms shall be the responsibility of the "R" Certificate Holder performing the repairs, alterations, or modifications and shall comply with the requirements provided in NBIC Part 3, 5.2.1, 5.2.2 and 5.2.4.

S6.19.3 DISTRIBUTION OF FORM "R" REPORTS

Distribution of Form "R" Reports shall comply with the requirements provided in NBIC Part 3, 5.3 and 5.4

S6.19.4 REGISTRATION OF FORM "R" REPORTS

- a) Repair organizations performing repairs, alterations, or modifications required by this supplement shall submit the completed "R" Form, meeting the requirements of the NBIC, to the National Board.
- b) The repair organization shall maintain a sequential Form Registration Log as described in Part 3, 5.6.



PROPOSED REVISION OR ADDITION

Item No. A 24-01	
Subject/Title Change to Examples of Repairs	
NBIC Location Part: Repairs and Alterations; Section: 3; Paragraph: 3.3.3(j)	
Project Manager and Task Group	
Source (Name/Email) Matt Schaser / mschaser@e2g.com	
Statement 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 ASME design requirements.	
Background Information A recent interpretation request (I23-64) has identified a potential nonconservative design requirement in the example of a repair, paragraph 3.3.3(j), "addition of identical nozzles". The caveat regarding nozzle spacing appears arbitrary and may be nonconservative if a new nozzle is installed close to a larger nozzle. Revision to 3.3.3(j) is needed to establish a code-based spacing requirement to cover ASME design requirements.	
Existing Text The addition of a nozzle where reinforcement is a consideration may be considered to be a repair, provided the nozzle is identical to one in the original design, located in a similar part of the vessel, and not closer than three times its diameter from another nozzle. The addition of such a nozzle shall be restricted by any service requirements.	Proposed Text The addition of a nozzle where reinforcement is a consideration may be considered to be a repair, provided the nozzle is identical to one in the original design (<u>including orientation</u>), located in a similar part of the vessel, <u>and whose reinforcement meets the requirements of the applicable code of construction and not closer than three times its diameter from another nozzle</u> . The addition of such a nozzle shall be restricted by any service requirements.

COMMITTEE	VOTE:				Passed	Failed	Date
	Approved	Disapproved	Abstained	Not Voting			

no vote A24-01

Cutlip, Eric V <evcutlip@babcock.com>

Tue 1/9/2024 5:47 PM

To:Terrence Hellman <THellman@nationalboard.org>

Terry,

I voted "no" on item A24-01 because I don't think the new words are necessary which requires the orientation of the new nozzle be identical to an existing nozzle.



Eric Cutlip

Quality Assurance Manager

Email: evcutlip@babcock.com

Desk: 330-860-2637

Mobile: 216-337-0037

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A24 -01

Louis Dutra <ldutra@baycityboiler.com>

Fri 1/12/2024 3:10 PM

To:Terrence Hellman <THellman@nationalboard.org>

Terry,

My vote No is for the following reason:

Based upon the past jobs I have completed with using this verbiage in the code is adequate for certificate holders. If we change the verbiage, it could cause certificate holders to do calculations.

Thank you!

How would you rate your experience?



Louis Dutra

Aftermarket Sales
QA/QC Manager

- Office: (209) 490-4010
- Mobile: (925) 348-2881
- ldutra@baycityboiler.com
- www.baycityboiler.com
- 4519 S. B Street, Stockton, CA 95206

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How would you rate your experience?





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Action item 24-01

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

Tue 1/9/2024 5:32 PM

To:Terrence Hellman <THellman@nationalboard.org>;Underwood Robert - Hartford-Remote-HSB <robert_underwood@hsb.com>;McBee, Timothy <Timothy.McBee@tuvsud.com>

Terry,

I voted no on this item as I believe that the proposed wording will require calculations to be performed and Repair Only certificate holders do not have those capabilities.

Jon Ferreira

Technical Service Manager
Global Inspection and Engineering Services

The Hartford Steam Boiler Inspection and Insurance Company

One State Street
P.O. Box 5024
Hartford, CT 06102-5024
Telephone: +1 (207) 745-6889

Jonathan_Ferreira@hsb.com

www.munichre.com/HSB



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A24-01 disapproval

Kinney, Don <don.kinney@labor.nc.gov>

Tue 1/9/2024 5:31 PM

To:Terrence Hellman <THellman@nationalboard.org>

Cc:Underwood Robert - Hartford-Remote-HSB <robert_underwood@hsb.com>

Terry, I voted to disapprove action item A24-01 because, in my opinion, the proposed wording changes the intent of the paragraph from being a repair example to an alteration example. The current wording allows a certificate holder, with a repair only scope, guidance for the addition of the new nozzle without performing calculations IAW with the OCC.

Don Kinney, Bureau Chief
North Carolina Department of Labor
Boiler Safety Bureau
Office: [919-707-7911](tel:919-707-7911)

<https://www.labor.nc.gov/safety-and-health/boiler-and-pressure-vessel-safety>

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A24-01

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

Tue 1/9/2024 5:29 PM

To:Terrence Hellman <THellman@nationalboard.org>

Terry,

My negative vote was due to limiting the Certificate Holders utilizing the 3 times rule for nozzle spacings.

Respectfully,

Tim McBee

Manager of Codes and Standards

Phone: 217-412-9300

Email address: Timothy.McBee@tuvsud.com



Business address

ARISE Boiler Inspection and Insurance Company RRG

Grand Bay I, 7000 S. Edgerton Road

Suite 100

Brecksville, Ohio 44141

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A24-01

Kathy Moore <kathymoore@joemoorecompany.com>

Tue 1/9/2024 5:29 PM

To:Terrence Hellman <THellman@nationalboard.org>

I disapproved because I think the implications of the wording is far reaching. I feel the existing test with clarification of how it is measured (C-C) or edge to edge) would be a good example

--

Kathy Moore

Joe Moore & Company, Inc.

PH: (919) 832-1665

Disapproval Vote explanation on Action Item - A24-01

Benjamin Schaefer <bschaefer@aep.com>

Tue 1/9/2024 6:08 PM

To:Terrence Hellman <THellman@nationalboard.org>

Mr. Secretary,

I voted negative on action item A24-01 because I don't think the voted changes are needed. The addition of "orientation" is covered by the existing term "Identical". I also understand the "3 times its diameter from another nozzle" wording currently widely used and should not be removed.

Ben Schaefer



THE NATIONAL BOARD
OF BOILER AND PRESSURE VESSEL INSPECTORS

PROPOSED REVISION OR ADDITION

Item No. A 24-02 Rev 00	
Subject/Title Revision to S6.18 approved for 2025 under item A 23-25	
NBIC Location	
Project Manager and Task Group Philip Gilston	
Source (Name/email) Philip Gilston (philip_gilston@hsb.com)	
Statement of Need Elimination of duplicate wording between S6.18.3 approved for 2025 in item A 20-67 and S6.18 approved for 2025 under item A 20-25.	
Background Information Verbiage approved for the 2025 Edition via A20-67 created a new S6.18.3 paragraph: "S6.18.3 REPLACEMENT OF STEMPING OR NAMEPLATE Replacement of indistinct stamping or lost, illegible, or detached nameplates shall comply with the requirements provided in NBIC Part 2, 5.2." Verbiage approved for the 2025 Edition via A23-25 included a new last sentence in S6.18: "For application of new replacement stamping or the attachment of a new or duplicate nameplate when the original is lost, illegible, or a duplicated is desired, see NBIC Part 2, 5.2 requirements." This proposal is to delete the last sentence in S6.18 to remove redundancy. Also deleted word "governing" from "Competent governing Authority" in the opening sentence. The use of "governing" is not made anywhere else in Part in relation to the Competent Authority.	
Existing Text (approved item A 23-25 for 2025) S6.18 GENERAL STAMPING REQUIREMENTS The stamping of or attaching of a nameplate to a pressure-retaining item, shall indicate that the work was performed in accordance with the requirements of this code and any requirements of the Competent governing Authority. 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 the repair or the construction portion of the modification/alteration shall apply the stamping. For a re-rating where no physical changes are made to the pressure-retaining item, the "R" Certificate Holder responsible for the design shall apply the stamping. Requirements for stamping and nameplate information are shown in NBIC Part 3, Section 5. For application of new replacement stamping or the attachment of a new or duplicate nameplate when the original is lost,	Proposed Text S6.18 GENERAL STAMPING REQUIREMENTS The stamping of or attaching of a nameplate to a pressure-retaining item, shall indicate that the work was performed in accordance with the requirements of this code and any requirements of the Competent governing Authority. 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 the repair or the construction portion of the modification/alteration shall apply the stamping. For a re-rating where no physical changes are made to the pressure-retaining item, the "R" Certificate Holder responsible for the design shall apply the stamping. Requirements for stamping and nameplate information are shown in NBIC Part 3, Section 5. For application of new replacement stamping or the attachment of a new or

illegible, or a duplicated is desired, see NBIC Part 2, 5.2 requirements.

~~duplicate nameplate when the original is lost, illegible, or a duplicated is desired, see NBIC Part 2, 5.2 requirements.~~

VOTE							
Committee	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

Engineered Alterations

NB23-09 Rev 564Supplement SXX??

Pressure Parts fabricated using Additively Manufactured Material

Section XX.1 Scope

Additively Manufactured (AM) pressure 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 GMAW process and are referred to as AM parts. AM parts replicate pressure retaining parts that were previously made using wrought or cast product forms. The requirements listed 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 an R-Certificate holder shall be considered an alteration. AM parts that are installed shall be limited to service temperatures below the creep range (e.g. time independent). In addition to the requirements for an alteration, the following documents 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:

- _____ 1) The governing Construction Code for the AM component.
- _____ 2) File names with current revision for all model data describing the geometry and build strategy needed to build the physical component.
- _____ 3) The applicable Material Specification listed in ASME BPVC Section II, Part A or Part B.
- _____ 4) The applicable Filler Metal Specification and AWS Classification listed in ASME BPVC Section II, Part C.
- _____ 5) Allowable ranges of process variables from ASME BPVC Section IX, Part QW, Article VI, "Material Manufacturing using Wire Additive Welding".
- _____ 6) The nondestructive evaluation and testing requirements being applied to the AM Material from the applicable ASME BPV Construction Code.
- _____ 7) Supplemental examination requirements identified by the Additive Manufacturer or the User.
- 8) Post-processing requirements identified by the Additive Manufacturer or the User.

_____9) Thermal treatment requirements for the AM Material identified by the Additive Manufacturer
_____ or the User.

_____10) Supplemental requirements identified by the Additive Manufacturer or the User
_____ (e.g., corrosion testing).

_____ (11) The Additive Manufacturing Specification shall be reviewed and accepted by the Inspector.

(b) copy of the design calculations which shall be based on the original code of construction.

(c) copy of the ASME Section IX qualified welding procedure specification that was followed and weld qualification record(s).

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

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

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

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

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

___(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).

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

___(4)___—Sufficient AM Material for qualification testing shall be produced to complete all required material testing.

___(5)___—Test specimens shall be extracted from the AM 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.).

___(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).

___(7)___ 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.

- (9) 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.
- (10) The tensile data generated for the ASME BPVC Section IX, Part QW, Article VI Additive “Material Manufacturing Procedure Qualification Requirements” (Section 6) may be included in the calculation of the total number of test specimens.
- (11) Chemical composition testing shall be performed in accordance with the requirements in Section (g).
- (12) Mechanical property testing shall be performed in accordance with the requirements of Section (g).
- (13) Metallographic testing shall be performed in accordance with the requirements of Section (h).

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

- (1) AM Material witness specimens shall be manufactured and tested for each production build to measure and verify on-going process stability.
- (2) At least one AM Material witness tension test specimen shall be manufactured and tested for each production build.
- (3) When toughness testing is required by the Construction Code, at least one AM Material witness toughness test specimen shall be manufactured and tested for each production build.
- (4) 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.
- (5) When a production component requires the use of multiple heats of filler metal AM Material witness specimens for tension and toughness testing shall be manufactured and tested from each heat of filler metal.
- (6) The witness specimens shall be extracted from the AM Material manufactured using bounding heat inputs and interpass temperatures that provides limiting values for tensile and toughness properties as determined by the Additive Manufacturer.
- (7) The witness specimens shall be manufactured either immediately before, during, or immediately after each production build.
- (8) All tension and toughness testing shall be performed in accordance with the requirements of Section (g).
- (9) Following any production test non-compliance, components fabricated during the build shall be dispositioned using the Additive Manufacturers Quality Control Program.
- (10) The results of the required witness specimen testing shall be documented in a Production Test Report certified by the Additive Manufacturer.

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

(f) Chemical Composition Testing~~HEMICAL COMPOSITION TESTING~~

- (1) One AM Material specimen from the qualification build shall be provided for chemical composition testing at a location determined by the Additive Manufacturer.
- (2) The analytical method for chemical composition testing shall be in accordance with the Material Specification.
- (3) The chemical composition of the specimens shall conform to the ASME filler metal specification identified in the Additive Manufacturing Specification.

(g) Mechanical Property Testing~~MECHANICAL PROPERTY TESTING~~

- (1) The build x, y, and z axes are defined in Figure 1.
- (2) The z axis is defined as normal to deposition layers (Parallel to Build Direction) as shown in Figure 1.

Tension Testing

- (1) All AM Material testing shall be performed on specimens in the final heat-treated condition identified in the Additive Manufacturing Specification.
- (2) Tension test specimens shall be constructed with their long direction parallel to the z-axis as shown in Figure 1.
- (3) All room temperature tension testing shall be in accordance with ASTM E8 (see Appendix A and B)
- (4) All elevated temperature tension testing shall be in accordance with ASTM E21 (see Appendix A and B).

Hardness Testing

- (1) 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.
- (2) The hardness testing shall be performed on the AM Material specimen in regions of the highest tensile strength.
- (3) Hardness testing shall comply with ASTM E10, ASTM E18 or ASTM E92.
- (4) The hardness values for the AM material shall comply with the Material Specification.

Toughness Testing

- (1) Toughness testing shall be performed when required by the Material Specification, Construction Code or the Additive Manufacturing Specification.
- (2) When toughness testing is required, toughness testing shall be performed on AM Material extracted from the qualification build and the witness specimens.
- (3) Toughness testing shall be performed in the AM Material specimen orientation as shown in Figure 1.
- (4) The acceptance criteria for toughness testing shall be as specified by the applicable Construction Code.

(h) ~~MMetallographic Examination~~ ETALLOGRAPHIC EVALUATIONS

- (1) Metallographic specimens shall be extracted from the AM Material produced during the qualification builds at bounding location of heat inputs and interpass temperatures as determined by the Additive Manufacturer.
- (2) 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.
- (3) The microstructure shall be examined at magnifications ranging from 50X to 200X.
- (4) The microstructure shall be reasonably uniform and free of cracks and lack of fusion defects.

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

(j) Examples of forms that could be used for document submittals with the Form R-2.

(k) results of the hydrostatic test as performed in accordance with the rules of the original code of construction

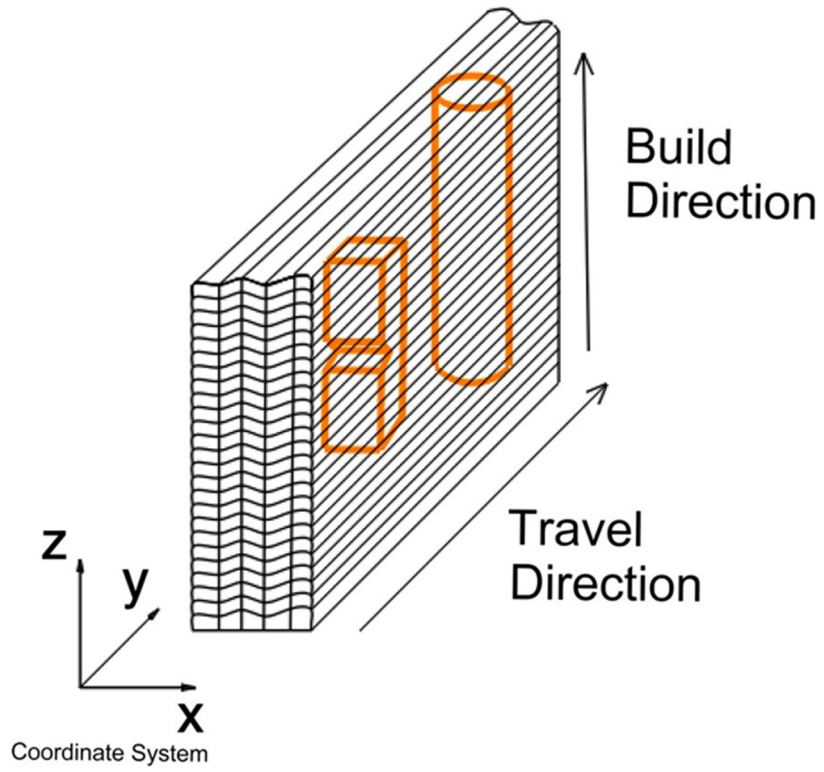


Figure 1 Material Manufacturing Coordinate System and Material Test Specimen Orientation

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.

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

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

|