

Date Distributed: June 27, 2023



*THE NATIONAL BOARD
OF BOILER AND PRESSURE VESSEL INSPECTORS*

NATIONAL BOARD INSPECTION CODE SUBGROUP REPAIRS & ALTERATIONS

AGENDA

Meeting of July 11th, 2023
St. Louis, MO

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

The Chair will call the meeting to order at 8:00 a.m. Central Time. For those attending in person, the meeting will be held in Cardinal A and B at the hotel.

2. Roll call of Members and Introduction of Visitors

3. Check for a Quorum

4. Announcements

- The National Board will be hosting a reception on Wednesday evening from 5:30 p.m. to 7:30 p.m. at Sports & Social St. Louis Ballpark Village next to the hotel.
- The National Board will be hosting breakfast and lunch on Thursday for those attending the Main Committee meeting. Breakfast will be served from 7:00 a.m. to 8:00 a.m. in Cardinal C, and lunch will be served from 11:30 a.m. to 12:30 p.m. in Cardinal C.
- Meeting schedules, meeting room layouts, and other helpful information can be found on the National Board website under the **Inspection Code** 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”.
- 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. Adoption of the Agenda

6. Approval of the Minutes of the January 10, 2023 Meeting

The minutes are available for review on the National Board website, www.nationalboard.org.

7. U.S. Chemical Safety Board Presentation

Representatives from the U.S. Chemical Safety Board will be giving a presentation regarding the 2017 Loy Lange Box Company pressure vessel explosion.

8. Review of Rosters

a. Membership Nominations

- i. Mr. Jonathan Ferreira (AIA) is interested in becoming a member of SG R&A.

b. Membership Reappointments

- i. The following Subgroup R&A memberships are set to expire prior to the January 2024 NBIC meetings: Mr. Brian Boseo, Mr. Ben Schaefer, Mr. Scott Chestnut, Mr. Paul Davis, Mr. Trevor Seime, and Mr. Rick Valdez.

c. Officer Nominations

- i. Mr. Boseo and Mr. Schaefer’s terms as Chair and Vice Chair are set to expire after this meeting, and they are not eligible for reappointment due to reaching the term limit. The Subgroup will need to propose a new Chair and Vice Chair to the Subcommittee for appointment.

9. Action Items

Item Number: A21-12	NBIC Location: Part 3, 3.3.3, 3.4.4, Section 9	No Attachment
General Description: Clarify the definitions and examples of “Repair” and “Alteration”		
Subgroup: Repairs and Alterations		
Task Group: K. Moore, R. Underwood, M. Chestnut, T. Seime		
Explanation of Need: Clarify the definitions of “Repair” and “Alteration” in the Glossary and revise the list of examples of each to better define the allowable scope of activities.		
Jan. SG R&A 2023 Meeting Action: P. Becker presented a PR.		

Item Number: A21-31	NBIC Location: NBIC Glossary	No Attachment
General Description: Revise definition of "Field"		
Subgroup: Repairs and Alterations		
Task Group: R. Miletto (PM), P. Gilston, M. Toth, J. Walker		
Explanation of Need: A "Field" site under the current definition could be multiple rented or leased spaces used for repairs/alterations, where there is no single or specific customer or job, but rather the location(s) are used for conducting repair/alteration activities by personnel employed by the Certificate Holder on a continual basis.		
Jan. SG R&A 2023 Meeting Action: R. Miletto presented a PR. Revisions to NB-415 will be required first.		

Item Number: A21-43	NBIC Location: Part 3, Glossary	No Attachment
General Description: Defining and revising "Practicable" and "Practical" within the NBIC		
Subgroup: Repairs and Alterations		
Task Group: M. Toth (PM), B. Underwood		
Explanation of Need: Defining and revising Practicable and Practical within the NBIC and revising where applicable		
Jan. SG R&A 2023 Meeting Action: M. Toth presented a PR.		

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, B. Wielgoszinski		
Explanation of Need: Defining de-rating within Part 3		
Jan. SG R&A 2023 Meeting Action: M. Toth presented a PR.		

Item Number: A21-45	NBIC Location: Part 3, Supplements	Attachment Page 2
General Description: Add a supplement to address oil, gas and chemical repair & alteration scope		
Subgroup: Repairs and Alterations		
Task Group: R. Underwood (PM)		
Explanation of Need: There has been interest from companies operating with the Oil, Gas and Chemical industries to address certain types of repairs that may exist in ASME PCC-2 or API. NBIC does not have many of these repair methods within the book.		
Jan. SG R&A 2023 Meeting Action: B. Underwood presented a PR.		

Item Number: A21-53	NBIC Location: Part 3, S8.5 a)	No Attachment
General Description: Post Repair Inspection of weld repairs to CSEF steels		
Subgroup: Repairs and Alterations		
Task Group: P. Gilston (PM), E. Cutlip		
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.		
Jan. SG R&A 2023 Meeting Action: P. Gilston presented a PR.		

Item Number: A21-67	NBIC Location: Part 3, 3.4.9	No Attachment
General Description: Add welding requirements to plugging firetubes		
Subgroup: Repairs and Alterations		
Task Group: P. Gilston (PM), K. Moore, M. Quisenberry, T. Sieme		
Explanation of Need: The current NBIC does not have enough direction or requirements for welding tube plugs in firetubes.		
Jan. SG R&A 2023 Meeting Action: P. Gilston presented a PR.		

Item Number: A21-82	NBIC Location: Part 3, 3.3.3(s)	Attachment Page 3
General Description: Examples of Repairs		
Subgroup: Repairs and Alterations		
Task Group: P. Davis (PM), R. Underwood, P. Gilston, , J. Ferreira, J. Walker, E. Cutlip, . P. Miller, L. Dutra		
Explanation of Need: Adding "repair" to 3.3.3(s) would then address use of different weld material. Currently 3.3.3(s) only addresses replacement of the part, not repair (Repair is addressed in 3.3.3(r)).		
Jan. SG R&A 2023 Meeting Action: P. Davis presented a PR.		

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		
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.		
Jan. SG R&A 2023 Meeting Action: K. Moore presented a PR.		

Item Number: A22-19	NBIC Location: Part 3, 5.2.2	No Attachment
General Description: R Certificate Holders with Design Only Scope		
Subgroup: Repairs and Alterations		
Task Group: J. Ferreira (PM), R. Valdez, G. Scribner, B. Schaefer		
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.		
Jan. SG R&A 2023 Meeting Action: J. Ferreira presented a PR.		

Item Number: A22-41	NBIC Location: Part 3, 1.5	No Attachment
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.		
Jan. SG R&A 2023 Meeting Action: P. Davis selected as PM. Added M. Carlson, L. Ponce and J. Walker to TG – This was a PR.		

Item Number: A23-04	NBIC Location: Part 3, 3.3.4.6 a) 2)	Attachment Page 5
General Description: Address Flush Patch Plate Weld NDT		
Subgroup: Repairs and Alterations		
Task Group: J. Ferreira (PM), K. Moore, M. Schaser, T. McBee, F. Johnson, M. Schaser		
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.		
Jan. SG R&A 2023 Meeting Action: K. Moore presented. Added M. Schaser to TG. This was a PR.		

New Action Items:

Item Number: A23-12	NBIC Location: Part 3	No Attachment
General Description: Inspector involvement for repairs of wasted areas		
Subgroup: Repairs and Alterations		
Task Group: R. Valdez (PM), J. Ferreira		
Explanation of Need: Based on recommendations by CSB, should an Inspector be required to physically view equipment that is being repaired in a wasted area prior to any repair/alteration activity?		
July 2023 Meeting Action:		

Item Number: A23-13	NBIC Location: Part 3, 3.3.3 s)	Attachment Page 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:		

Item Number: A23-14	NBIC Location: Part 3, Table S9.2	Attachment Page 7
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:		

Item Number: A23-21	NBIC Location: Part 3, 3.3.4.9	Attachment Page 12
General Description: Boiler tube plug guidelines and inclusion or watertube boilers		
Subgroup: Repairs and Alterations		
Task Group: E. Cutlip (PM), P. Gilston, K. Moore		
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:		

Item Number: A23-22	NBIC Location: Part 3, 2.5.3.4	Attachment Page 13
General Description: Changes to Part 3, 2.5.3.4 to clarify intent		
Subgroup: Repairs and Alterations		
Task Group: T. White (PM)		
Explanation of Need: As written, this paragraph is ambiguous and confusing. The rewrite clarifies the paragraphs intent.		
July 2023 Meeting Action:		

Item Number: A23-24	NBIC Location: Part 3	No Attachment
<p>General Description: Repairs to quick actuating closures</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: T. McBee (PM), C. Becker, M. Schaser, A. Khssassi, R. Smith</p> <p>Explanation of Need: Put safe guidelines for repairs to quick actuating closures.</p> <p>July 2023 Meeting Action:</p>		

Item Number: A23-25	NBIC Location: Part 3, 5.11	No Attachment
<p>General Description: Name Plate replacement</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: R. Valdez (PM), J. Ferreira</p> <p>Explanation of Need: This does not address missing name plates. NB136 is about the form not the name plate. This needs to address missing name plates as well. There should also be a reference to point the Stamp Holder Part 2 - 5.2</p> <p>July 2023 Meeting Action:</p>		

Item Number: A23-29	NBIC Location: Part 3, 1.5.1 s)	Attachment Page 15
<p>General Description: Clarification of Intent</p> <p>Subgroup: Repairs and Alterations</p> <p>Task Group: S. Chestnut (PM),</p> <p>Explanation of Need: The sentence is unclear as it currently reads. With the new wording it clarifies the intent.</p> <p>July 2023 Meeting Action:</p>		

Item Number: A23-33	NBIC Location: Part 3, Table 2.3	Attachment Page 16
General Description: Update Table 2.3 to remove dates		
Subgroup: Repairs and Alterations		
Task Group: J. Sekely (PM)		
Explanation of Need: Since the use of all current and previous versions of the listed SWPS's is permitted, there is no reason to date the listed SWPSs.		
July 2023 Meeting Action:		

Item Number: A23-35	NBIC Location: All Parts, 9.1	Attachment Page 18
General Description: Definition of "non-load bearing attachment" (All Parts)		
Subgroup: Repairs and Alterations		
Task Group: None assigned.		
Explanation of Need: The term "nonload bearing attachment" is used as a basis for determining a routine repair but is not defined in the NBIC.		
July 2023 Meeting Action:		

Item Number: A23-36	NBIC Location: Part 3, 4.2 a) and 4.4 b)	Attachment Page 19
General Description: Clarifying Rules for Using Alternative NDE Methods		
Subgroup: Repairs and Alterations		
Task Group: None assigned.		
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:		

Item Number: A23-38	NBIC Location: Part 3, 1.1 a)	Attachment Page 20
General Description: Scope Clarification for Part 3		
Subgroup: Repairs and Alterations		
Task Group: None assigned.		
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:		

Item Number: A23-39	NBIC Location: Part 3, 3.3.1	Attachment Page 21
General Description: Strengthening Prevention of Defect Recurrence		
Subgroup: Repairs and Alterations		
Task Group: None assigned.		
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.		
July 2023 Meeting Action:		

Item Number: A23-40	NBIC Location: Part 3, 3.3.4.1	Attachment Page 23
General Description: Strengthening Requirements to Ensure Defect Removal		
Subgroup: Repairs and Alterations		
Task Group: None assigned.		
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.		
July 2023 Meeting Action:		

Item Number: A23-41	NBIC Location: Part 3, 3.3.4.6 a) 2)	Attachment Page 25
General Description: Strengthening Requirements for Defect Removal When Patching		
Subgroup: Repairs and Alterations		
Task Group: None assigned.		
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.		
July 2023 Meeting Action:		

Item Number: A23-49	NBIC Location: Part 3, 3.2.1 a)	Attachment Page 27
General Description: Hardness testing of existing materials		
Subgroup: Repairs and Alterations		
Task Group: None assigned.		
Explanation of Need: Field hardness testing of existing materials may be difficult and produce erroneous results. It is usually unnecessary for determining properties required for selection of welding procedures. Unless needed, it should not be required to be performed. The purpose of verifying existing materials in Paragraph 3.2.1 a) is not to confirm acceptability of existing design, but to determine nominal composition for welding.		
July 2023 Meeting Action:		

Item Number: A23-51	NBIC Location: Part 3, 1.5.1	Attachment Page 28
General Description: Replace "legal" with "company" in 1.5.1 a) Title Page		
Subgroup: Repairs and Alterations		
Task Group: None assigned.		
Explanation of Need: The National Board has not adopted the ASME policy regarding company and legal names. Per the ASME policy it is permissible to have two names on a Certificate of Authorization and the quality manual. The 2023 NBIC 1.5.1 a) "legal" term may cause confusion for certificate holders, their AIAs, and review teams.		
July 2023 Meeting Action:		

10. Future Meetings

- January 8-11, 2024 – Charlotte, NC
- July 2024 – TBD

11. Adjournment

Respectfully submitted,

Terrence Hellman

Terrence Hellman

SG R&A Secretary

Subgroup Repairs/Alterations

Last Name	First Name	Interest Category	Role	Exp. Date	More
Boseo	Brian	General Interest	Chair	07/30/2023	Details
Schaefer	Benjamin	National Board Certificate Holders	Vice Chair	07/30/2023	Details
Hellman	Terrence		Secretary	12/30/2099	Details
Chestnut	Scott	Users	Member	07/30/2023	Details
Cutlip	Eric	National Board Certificate Holders	Member	01/30/2025	Details
Davis	Paul	Manufacturers	Member	07/30/2023	Details
Dutra	Louis	National Board Certificate Holders	Member	01/29/2026	Details
Frazier	Steven	Jurisdictional Authorities	Member	07/30/2024	Details
Gilston	Philip	Authorized Inspection Agencies	Member	07/20/2024	Details
Hopkins	Craig	National Board Certificate Holders	Member	01/30/2026	Details
Johnson	Frank	Users	Member	01/30/2024	Details
Khssassi	Aziz	Jurisdictional Authorities	Member	01/29/2026	Details
Kinney	Donald	Jurisdictional Authorities	Member	01/30/2024	Details
McBee	Timothy	Authorized Inspection Agencies	Member	07/30/2025	Details
Moore	Kathy	National Board Certificate Holders	Member	01/30/2024	Details
Morelock	Brian	Users	Member	01/30/2024	Details
Quisenberry	Michael	National Board Certificate Holders	Member	07/30/2024	Details
Seime	Trevor	Jurisdictional Authorities	Member	07/30/2023	Details
Sekely	James	General Interest	Member	07/30/2024	Details
Siefert	John	General Interest	Member	07/30/2024	Details
Sperko	Walter	General Interest	Member	01/30/2026	Details
Spuhl	Raymond	Authorized Inspection Agencies	Member	01/30/2025	Details
Toth	Marty	General Interest	Member	01/30/2026	Details
Underwood	Robert	Authorized Inspection Agencies	Member	07/30/2025	Details
Valdez	Rick	Manufacturers	Member	08/30/2023	Details
Walker	Jamie	National Board Certificate Holders	Member	07/30/2024	Details
White	Tom	Users	Member	01/30/2024	Details

Item 21-45 Review and Comment for the general “Scope” of the proposed supplement “Engineered Repairs and Alterations”

Note: Each Repair and Alteration activity that will be added to this supplement (such as fillet welded patches, FEA, Encapsulation, etc...) will have its own detailed Scope.

SUPPLEMENT XX – ENGINEERED REPAIRS AND ALTERATIONS

SXX.1 SCOPE

- a) This supplement provides general and specific requirements for engineered repairs and alterations to pressure retaining items. These requirements shall be considered as supplemental requirements to those set forth in the main Parts of the NBIC.
- b) Engineered repairs and alterations contained in this supplement will require acceptance by the Inspector and when required by the Jurisdiction. Procedures and methodologies established and proven in the industry are leveraged through references to published documents. Supplemental requirements are provided as necessary.
- c) Implementation of engineered repairs and alterations will typically require specific inspection procedures, material identification and/or testing, a complete characterization of damage assessment, and knowledge of process conditions, etc. The remaining life and monitoring requirements of any engineered repair or alteration should be established prior to implementation.
- d) Careful consideration shall be given to repair or alteration of pressure-retaining items that have been fabricated of either creep strength enhanced ferritic steel materials or ferritic steel materials enhanced by heat treatment. The tensile and creep strength properties of these materials can be degraded by not following specific welding procedure specifications and heat treatment requirements. The user is cautioned to seek technical guidance for welding and heat treating requirements for these materials in accordance with the original code of construction.
- e) A safety analysis may be necessary for certain engineered repairs and alteration activities to ensure safe operation of equipment and minimal risk to personnel.



PROPOSED REVISION OR ADDITION

Item No. A 21-82	
Subject/Title Selection of Filler Metal used for Repairs and Alterations	
NBIC Location Part 3: Section: 2, paragraph 2.1.1(c) and Section 3; Paragraph: 3.3.3(s)	
Project Manager and Task Group Paul Davis, Subcommittee Repairs/Alterations	
Source (Name/Email) Paul Davis / paul.davis22@woodplc.com	
Statement of Need The NBIC does not address the selection of welding consumables to be used when performing repairs and alterations.	
Background Information We have had some recent questions from repair firms about using different weld metal when performing repairs of pressure retaining items. The NBIC does not directly address use of weld metal that is different than the original design. This proposal would create a new 2.1.1(c) with words taken from ASME Section I that addresses who is responsible for selecting the filler metal and how they are selected. A new paragraph 3.3.3(s) adds a new repair example that addresses adding filler metal equal to or greater in TS than the base metal with some exceptions.	
Existing Text See next page	Proposed Text See next page for proposal.

COMMITTEE	VOTE:				Passed	Failed	Date
	Approved	Disapproved	Abstained	Not Voting			

Revision to 2.2.1

- *add letters “a” and “b” to existing paragraphs and add new “c” paragraph which is wording from ASME Section I*

2.2.1 PROCEDURE SPECIFICATIONS

- a) A procedure specification is a written document providing direction to the person applying the material joining process. Welding, brazing and fusing shall be performed in accordance with procedure specifications for welding (WPS), brazing (BPS), and fusing (FPS) qualified in accordance with the original code of construction or the construction standard or code selected. When this is not possible or practicable, the procedure specification may be qualified in accordance with ASME Section IX.
- b) Welding procedures may be simultaneously qualified by more than one organization under the rules of ASME Section IX QG-106.4. The “R” Certificate Holder’s written quality control program shall include requirements for addressing the rules of Section IX QG-106.4.
- c) The “R” Certificate Holder is responsible for the selection of welding consumables and the welding process. Welding electrodes and filler metal shall be selected to provide deposited weld metal of chemical composition and mechanical properties compatible with the materials to be joined and the service conditions anticipated.

Revision to 3.3.3 (Examples of Repairs)

- *Insert a new paragraph (s) with the old (s) and subsequent paragraphs being re-lettered (t, u, v...). This paragraph essentially states that any filler metal with equivalent or greater tensile strength as the base metal (with noted exceptions) is considered a repair.*

- r) The repair or replacement of a pressure part with a code-accepted material that has a nominal composition and strength that is equivalent to the original material and is suitable for the intended service.
- s) A repair of a pressure part where, with the exception of the root pass, the nominal tensile strength of the weld metal, not considered to be corrosion resistant overlay, equals or exceeds the minimum specified tensile strength of the base metals being repaired or joined unless the original weldment was fabricated using a weld metal with a lower tensile strength of the base metals to be repaired or joined.
- t) Replacement of a pressure-retaining part with a material of different nominal composition and, equal to or greater in allowable stress from that used in the original design, provided the replacement material satisfies the material and design requirements of the original code of construction under which the vessel was built. The minimum required thickness shall be at least equal to the thickness stated on the original Manufacturer’s Data Report;

Item A-23-04 (Revised Proposal after hearing feedback from several people)

[New proposed 2025 changes](#)

3.3.4.6 PATCHES

a) Flush Patches

- 1) The weld around a flush patch shall be a full penetration weld and the accessible surfaces shall be ground flush where required by the applicable original code of construction. Examples of welded flush patches are shown in NBIC Part 3, Figure 3.3.4.6-a.
 - 2) Before installing a flush patch, defective material shall be removed until sound material is reached. The patch shall be formed to the proper shape or curvature. The edges shall align without overlap. In stayed areas, the weld seams should come between staybolt rows or riveted seams. Patches shall be made from a material whose composition and thickness meet the intended service. Patches may be any shape or size. If the patch is rectangular, a minimum radius of not less than three times the material thickness shall be provided at the corners. Square corners are not permitted. The completed welds shall meet the requirements of the original code of construction.
 - 3) [Nondestructive examination shall be performed in accordance with the requirements from NBIC Part 3, Section 4.2. As an alternative to volumetric examination, when required, for flush patches, in P-No 1, 3 and 8 materials only, progressive liquid penetrant or magnetic particle examination as described in paragraph 3.3.4.6 \(a\)\(3\)\(a\) may be used. This alternative NDE method is subject to the acceptance of the Inspector, owner and when required, the Jurisdiction where the pressure-retaining item is installed, provided that all other requirements of this section are met.](#)
- a) [Liquid penetrant or magnetic particle examination shall be performed on each layer of the weld to be examined, including the final weld. Prior to performing PT or MT the surface of each layer of weld should be ground. The final weld may be examined with without grinding. The NDE report shall include the number of layers examined.](#)

PROPOSED REVISION OR ADDITION

Item No. A 23-13	
	
Subject/Title New item for consistent addressing of the term for weld metal	
NBIC Location Part: Repairs and Alterations; Section: 3; Paragraph: 3.3.3(s)	
Project Manager and Task Group	
Source (Name/Email) Terrence Hellman / thellman@nationalboard.org	
Statement of Need New 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.	
Background Information New 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.	
Existing Text	Proposed Text

New item for addressing consistent addressing of the term for weld metal is being opened based on discussions on A21-82. P. Gilston (PM); J. Siefert (other TG members TBD)

Frank Johnson's proposal:

Weld Metal – Weld Metal is the material that has melted and re-solidified as the result of the weld operation. In cases where no filler is added (resistance, electron beam, lazer and some autogenous arc welding) The weld metal has the same composition as the parent metal.

Filler Metal – Filler metal is the metal or alloy that is added to making a welded, brazed, or soldered joint' The filler is melted or drawn into the joint during the welding process. It serves to join two pieces of metal together and fill any gaps that may be present.

Weld Filler Maternal – There are many different types of filler that can be used in welding, and the type that is used will depend on the metal being welded, the strength of the joint that is needed and the appearance of the finished weld. The welding filler material can be made of a variety of metals alloys and fluxes, to make a strong reliable joint.

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

FIGURE S9.2.1

FORM R-1, PAGE 1 OF 2

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS NB-66, Rev. 16, (02/04/21)

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

① _____
(Authorized Rep. initials)

② _____
(Inspectors initials)

③ _____
(Form "R" Registration no.)

④ _____
(P.O. no., job no., etc.)

1. WORK PERFORMED BY: ⑤ _____
(name of repair organization)

_____ (address)

2. OWNER: ⑥ _____
(name)

_____ (address)

3. LOCATION OF INSTALLATION: ⑦ _____
(name)

_____ (address)

4. ITEM IDENTIFICATION: ⑧ _____ NAME OF ORIGINAL MANUFACTURER: ⑨ _____
(boiler, pressure vessel, or piping)

5. IDENTIFYING NOS: ⑩ _____ ⑪ _____ ⑫ _____ ⑬ _____ ⑭ _____
(mfg. serial no.) (National Board no.) (jurisdiction no.) (other) (year built)

6. NBIC EDITION/ADDENDA: ⑮ _____ (edition) _____ (addenda)

Original Code of Construction for Item: ⑯ _____ (name / section / division) _____ (edition / addenda)

Construction Code Used for Repair Performed: ⑰ _____ (name / section / division) _____ (edition / addenda)

7. REPAIR TYPE: ⑱ welded graphite pressure equipment FRP pressure equipment DOT

8. DESCRIPTION OF WORK: Form R-4, Report Supplement Sheet is attached FFSA Form (NB-403) is attached
(use Form R-4, if necessary)

⑲ _____

⑳ _____ Pressure Test, if applied ㉑ _____ psi MAWP ㉒ _____ psi
(Liquid, Pneumatic, Vacuum, Leak)

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

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

㉓ _____

10. REMARKS: ㉔ _____

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

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SUPPL. 9

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

 <p>THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS</p>	<p>NB-66, Rev. 16, (02/04/21)</p> <p>(25)</p> <p>(Form "R" Registration no.)</p> <p>(26)</p> <p>(P.O. no., job no., etc.)</p>
<p>CERTIFICATE OF COMPLIANCE</p> <p>I, (27) _____, certify that to the best of my knowledge and belief the statements made in this report are correct and that all material, construction, and workmanship on this Repair conforms to the <i>National Board Inspection Code</i>. National Board "R" Certificate of Authorization No. (28) _____ Expiration date: (29) _____</p> <p>Repair Organization: (30) _____</p> <p>Signed: (31) _____ <small>(authorized representative)</small></p> <p>Date: (32) _____</p>	
<p>CERTIFICATE OF INSPECTION</p> <p>I, (33) _____, holding a valid commission issued by The National Board of Boiler and Pressure Vessel Inspectors and certificate of competency, where required, issued by the Jurisdiction of (34) _____ and employed by (35) _____ of (36) _____ have inspected the work described in this report on (37) _____, _____ and state that to the best of my knowledge and belief, this work complies with the applicable requirements of the <i>National Board Inspection Code</i>. By signing this certificate, neither the undersigned nor my employer makes any warranty, expressed or implied, concerning the work described in this report. Furthermore, neither the undersigned nor my employer shall be liable in any manner for any personal injury, property damage, or loss of any kind arising from or connected with this inspection.</p> <p>Commissions: (38) _____ <small>(National Board and Jurisdiction no. including endorsement)</small></p> <p>Signed: (39) _____ <small>(Inspector)</small></p> <p>Date: (40) _____</p>	
<p><small>This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, Ohio 43229-1183</small></p>	

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

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

TABLE S9.2 CONT'D

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

TABLE S9.2 CONT'D

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



PROPOSED REVISION OR ADDITION

Item No. A 23-21	
Subject/Title Boiler tube plug guidelines and inclusion or watertube boilers	
NBIC Location Part: Repairs and Alterations; Section: 3; Paragraph: 3.3.4.9	
Project Manager and Task Group	
Source (Name/Email) David Starr / dave.starr@starrcompanies.com	
Statement 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.	
Background Information Boilers of both types require a boiler tube to be plugged on occasion whereas a more permanent option is not available. Current code seems to limit the use of plugs to firetube and fail to address watertube boilers. This change would provide guidance for both types of boilers.	
Existing Text 3.3.4.9 TUBE PLUGGING IN FIRETUBE BOILERS	Proposed Text 3.3.4.9 TUBE PLUGGING IN FIRETUBE AND WATERTUBE BOILERS

VOTE:							
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date



PROPOSED REVISION OR ADDITION

Item No. 23-	
Subject/Title Welding Method 4	
NBIC Location Part: Repairs and Alterations; Section: 3; Paragraphs: 2.5.3.4 a)	
Project Manager and Task Group PM – Tom White	
Source (Name/email) Tom White/thomas.white@nrg.com	
Statement of Need Reading up on Welding Method 4 in Part 3 I found the wording ambiguous and confusing. I have proposed the following rewrite for 2.5.3.4 – a)	
Background Information The second sentence states repair welds shall not penetrate the full thickness. The next sentence contradicts that statement and permits under the certain conditions. I propose the following rewrite for clarity.	
Existing Text – 2.5.3.4 When using this method, the following is required: a) This method is limited to repair welds in pressure retaining items for which the applicable rules of the original code of construction did not require notch toughness testing. The repair depth for temper bead repairs to pressure retaining items is limited to welds not penetrating though the full thickness. Full thickness temper bead weld repairs are permitted under the following conditions: 1) ASME Section VIII, Division 2 pressure vessels, where application of PWHT on in-service vessels has been demonstrated to cause harm to vessel material. 2) For tube-to-header welds in steam service. Full thickness weld repairs shall be completed per NBIC Part 3, 3.3.5 with the following requirements: 1) The full thickness repair shall be verified as being full penetration. 2) Volumetric examination of the full thickness weld shall be performed.	Proposed Text – 3.3.3 When using this method, the following is required: a) This method is limited to repair welds in pressure retaining items for which the applicable rules of the original code of construction did not require notch toughness testing. The repair depth for temper bead repairs to pressure retaining items shall not penetrate the full thickness except as permitted below. is limited to welds not penetrating though the full thickness. Full thickness temper bead weld repairs are permitted under the following conditions: 1) ASME Section VIII, Division 2 pressure vessels, where application of PWHT on in-service vessels has been demonstrated to be detrimental cause harm to the vessels material, or 2) For tube-to-header welds in steam service. Full thickness weld repairs, as permitted above, shall be completed per in accordance with NBIC Part 3, 3.3.5 and with the following additional requirements: 1) The full thickness repair shall be verified as being full penetration. 2) Volumetric examination of the full thickness weld shall be performed.

When I read the current verbiage of 2.5.3.4 – a) it was not clear. I have made some editorials changes I would like to see.

Current Wording:

2.5.3.4 WELDING METHOD 4

When using this method, the following is required:

a) This method is limited to repair welds in pressure retaining items for which the applicable rules of the original code of construction did not require notch toughness testing. The repair depth for temper bead repairs to pressure retaining items is limited to welds not penetrating though the full thickness.

Full thickness temper bead weld repairs are permitted under the following conditions:

- 1) ASME Section VIII, Division 2 pressure vessels, where application of PWHT on in-service vessels has been demonstrated to cause harm to vessel material.
- 2) For tube-to-header welds in steam service.

Full thickness weld repairs shall be completed per NBIC Part 3, 3.3.5 with the following requirements:

- 1) The full thickness repair shall be verified as being full penetration.
- 2) Volumetric examination of the full thickness weld shall be performed.

Proposed Wording:

2.5.3.4 WELDING METHOD 4

When using this method, the following is required:

a) This method is limited to repair welds in pressure retaining items for which the applicable rules of the original code of construction did not require notch toughness testing. The repair depth for temper bead repairs to pressure retaining items **shall not penetrate the full thickness except as permitted below:** ~~is limited to welds not penetrating though the full thickness.~~

~~Full thickness temper bead weld repairs are permitted under the following conditions:~~

- 1) ASME Section VIII, Division 2 pressure vessels, where application of PWHT on in-service vessels has been demonstrated to **be detrimental** ~~cause harm to the vessels material,~~ **or**
- 2) ~~For~~ **Tube**-to-header welds in steam service.

Full thickness weld repairs **as permitted above** shall be completed ~~per~~ **in accordance with** NBIC Part 3, 3.3.5 **and** ~~with~~ the following **additional** requirements:

- 1) The full thickness repair shall be verified as being full penetration.
- 2) Volumetric examination of the full thickness weld shall be performed.

1.5.1 OUTLINE OF REQUIREMENTS FOR A QUALITY SYSTEM FOR QUALIFICATION FOR THE NATIONAL BOARD “R” CERTIFICATE OF AUTHORIZATION

s) Exhibits

Forms referenced in the Quality System shall be included ~~and may be as~~ part of the referencing document or ~~included~~ as an exhibit or appendix. For clarity, the forms may be completed and identified as examples. Different forms may be utilized without the need for acceptance by the Inspector as long as they contain the same information as the exhibited forms.

2.3 STANDARD WELDING PROCEDURE SPECIFICATIONS (SWPS)

- a) One or more SWPSs from NBIC Part 3, Table 2.3 may be used as an alternative to one or more WPS documents qualified by the organization making the repair or alteration, provided the organization accepts by certification (contained therein) full responsibility for the application of the SWPS in conformance with the **Requirements for Application** as stated in the SWPS. When using SWPSs, all variables listed on the Standard Welding Procedure are considered essential and, therefore, the repair organization cannot deviate, modify, amend, or revise any SWPS. US Customary Units or metric units may be used for all SWPSs in NBIC Part 3, Table 2.3, but one system shall be used for application of the entire SWPS in accordance with the metric conversions contained in the SWPS. The user may issue supplementary instructions as allowed by the SWPS. Standard Welding Procedures Specifications shall not be used in the same product joint together with the other Standard Welding Procedure Specifications or other welding procedure specifications qualified by the organization. SWPSs may be purchased at the AWS Bookstore at <https://pubs.aws.org>.
- b) The AWS reaffirms, amends or revises SWPSs in accordance with ANSI procedures.
- c) The use of previous versions of the listed SWPSs is permitted. Previous versions include Reaffirmed, Amended, or Revised SWPSs regardless of the publication date.

TABLE 2.3

SWPS DESIGNATION: YEAR

B2.1-1-001:2020	B2.1-1-201:2019	B2.1-8-215:2012	B2.1-1/8-229:2013
B2.1-1-002:2020	B2.1-1-202:2019	B2.1-8-216:2012	B2.1-1/8-230:2013
B2.1-1-016:2018	B2.1-1-203:2019	B2.1-4-217:2021	B2.1-1/8-231:2015
B2.1-1-017:2018	B2.1-1-204:2019	B2.1-4-218:2021	B2.1-1-232:2020
B2.1-1-018:2020	B2.1-1-205:2019	B2.1-4-219:2021	B2.1-1-233:2020
B2.1-1-019:2018	B2.1-1-206:2019	B2.1-4-220:2021	B2.1-1-234:2020
B2.1-1-020:2018	B2.1-1-207:2019	B2.1-4-221:2021	B2.1-1-235:2020
B2.1-1-021:2018	B2.1-1-208:2019	B2.1-5A-222:2022	
B2.1-1-022:2018	B2.1-1-209:2019	B2.1-5A-223:2022	
B2.1-8-023:2018	B2.1-1-210:2012	B2.1-5A-224:2022	
B2.1-8-024:2012	B2.1-1-211:2012	B2.1-5A-225:2022	
B2.1-8-025:2012	B2.1-8-212:2012	B2.1-5A-226:2022	
B2.1-1-026:2018	B2.1-8-213:2012	B2.1-1/8-227:2013	
B2.1-1-027:2018	B2.1-8-214:2012	B2.1-1/8-228:2013	

TABLE 2.3

SWPS DESIGNATION:

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

2.4 AWS REFERENCE STANDARDS

The following AWS Standards have been adopted by the NBIC for use as referenced below:

- a) AWS B2.1 - Specification for Welding Procedure and Performance Qualification

5/10/2023

b) AWS B2.1 BMG - Base Metal Grouping for Welding Procedure and Performance Qualification

5/10/2023



PROPOSED REVISION OR ADDITION

Item No. A 23-35	
Subject/Title Definition of "nonload bearing attachment" (All Parts)	
NBIC Location Part: Repairs and Alterations; Section: 9; Paragraph: 9.1	
Project Manager and Task Group	
Source (Name/Email) Donald Kinney / don.kinney@labor.nc.gov	
Statement of Need The term "nonload bearing attachment" is used as a basis for determining a routine repair but is not defined in the NBIC.	
Background Information A Certificate Holder replaces/repairs internal rails/supports for trays or bins that get rolled into an autoclave. These rails/supports are (typically) stitch welded along the inside of the shell. The Certificate Holder believes this is a nonload bearing attachment and performs this work as a routine repair. The attachment of internals is a loading design consideration for ASME Sect. VIII Div.1.	
Existing Text	Proposed Text "nonload bearing attachment"- Any welded attachment that is not required to be considered a design loading by the original code of construction.

VOTE:							
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date



PROPOSED REVISION OR ADDITION

Item No. A 23-36	
Subject/Title Clarifying Rules for Using Alternative NDE Methods	
NBIC Location Part: Repairs and Alterations & Repairs and Alterations; Section: 4 & 4; Paragraph: 4.2 a) & 4.4 b)	
Project Manager and Task Group	
Source (Name/Email) Gary Scribner / gscribner@nbbi.org	
Statement 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 a reader may not familiarize themselves with all of the requirements of Section 4 prior to proposing an alternative NDE method. This change will help clarify and reinforce the requirements for alternative NDE methods for repairs and alterations.	
Background Information This change is being proposed as a result of the U.S. Chemical Safety Bureau's investigation of the Loy Lange Box Company pressure vessel explosion.	
Existing Text 4.2 NONDESTRUCTIVE EXAMINATION a) Nondestructive examination (NDE) requirements, including technique, extent of coverage, procedures, personnel qualification, and acceptance criteria, shall be in accordance with the original code of construction, standard, or specification selected for the repair or alteration of the pressure-retaining item (see NBIC Part 3, 1.2). Weld repairs and alterations shall be subjected to the same nondestructive examination requirements as the original welds. Where this is not possible or practicable, alternative NDE methods acceptable to the Inspector and the Jurisdiction where the pressure-retaining item is installed, where required, may be used, provided that all other requirements of this section are met. 4.4 Examination and Test for Repairs and Alterations a) The integrity of repairs, alterations, and replacement parts used in repairs and alterations shall be verified by examination or test; b) Testing methods used shall be suitable for providing meaningful results to verify the integrity of the repair or alteration. Any insulation, coatings, or coverings that may inhibit or compromise a meaningful test method shall be removed, to the extent identified by the Inspector;	Proposed Text 4.2 NONDESTRUCTIVE EXAMINATION a) Nondestructive examination (NDE) requirements, including technique, extent of coverage, procedures, personnel qualification, and acceptance criteria, shall be in accordance with the original code of construction, standard, or specification selected for the repair or alteration of the pressure-retaining item (see NBIC Part 3, 1.2). Weld repairs and alterations shall be subjected to the same nondestructive examination requirements as the original welds. Where this is not possible or practicable, alternative NDE methods acceptable to the Inspector and the Jurisdiction where the pressure-retaining item is installed, where required, may be used, <u>provided that the following requirements are met:</u> <u>1) Testing methods used shall be suitable for providing meaningful results to verify the integrity of the repair or alteration;</u> <u>2) Alternative NDE methods used for repairs shall be limited to those listed in Part 3, 4.4.1; and</u> <u>3) Alternative NDE methods used for alterations shall be limited to those listed in Part 3, 4.4.2.</u> 4.4 Examination and Test for Repairs and Alterations a) The integrity of repairs, alterations, and replacement parts used in repairs and alterations shall be verified by examination or test; b) Testing methods used shall be suitable for providing meaningful results to verify the integrity of the repair or alteration. Any insulation, coatings, or coverings that may inhibit or compromise a meaningful test method shall be removed, to the extent identified by the Inspector;



PROPOSED REVISION OR ADDITION

Item No. A 23-38	
Subject/Title Scope Clarification for Part 3	
NBIC Location Part: Repairs and Alterations; Section: 1; Paragraph: 1.1(a)	
Project Manager and Task Group	
Source (Name/Email) Adam Henson / adam.henson@csb.gov	
Statement 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.	
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. The full effect of the R stamp organization's understanding of an "emergency repair" and what bearing that had on the decision they made were not able to be established through the investigation. External pressure to work faster is however understood anecdotally to be determinantal to safety. Full details of the Loy-Lange Box Company Pressure Vessel Explosion are available at this link: https://www.csb.gov/loy-lange-box-company-pressure-vessel-explosion/ INTERPRETATION 17-01 Subject: Application of Term "Practicable Edition: 2017 Question: May the desire to save time and/or expense be used solely in determining if a repair and/or alteration activity is practicable? Reply: No. The determination of "practicable" shall be based on technical consideration of the nature and scope of repair and/or alteration activities.	
Existing Text This part provides requirements and guidelines that apply when performing repairs and alterations to pressure-retaining items.	Proposed Text This part provides requirements and guidelines that apply when performing repairs and alterations to pressure-retaining items. The financial and/or operational concerns of the owner or user associated with loss of use of equipment in need of repair or alteration shall have no bearing on the application of the requirements of this part.



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
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

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

Before a repair is made to a defect in a welded joint or base metal, an investigation to determine the cause, extent, and likelihood of recurrence of the defect shall be made by the owner or user of the pressure retaining item. This investigation shall be sufficiently thorough to determine the root cause(s) of the defect. The owner or user shall supply a statement as to how the likelihood of recurrence of the defect shall be reduced. For instance, if the cause of the defect is vehicular impact to equipment bollards may need to be installed in accordance with NBIC Part 1 Section ???, if the cause of the damage is oxygen pitting corrosion operating practices may need adjustment, etc. The time limit for implementing these measures shall be included in the owner or user's statement. This statement shall be signed by a senior member of management of the owner or user of the pressure retaining item. The R Certificate Holder shall attach the statement to the appropriate Form R and shall file the Form R with the National Board. If the cause of the defect cannot be determined through investigation the pressure retaining item should be inspected more frequently until the cause of the defect can be determined in accordance with NBIC Part 2, Section 4.4.

VOTE:							
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date



PROPOSED REVISION OR ADDITION

Item No. A 23-40
Subject/Title Strengthening Requirements to Ensure Defect Removal
NBIC Location Part: Repairs and Alterations; Section: 3; Paragraph: 4.1
Project Manager and Task Group
Source (Name/Email) Adam Henson / adam.henson@csb.gov
Statement 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.
Background Information On April 3, 2017, an explosion occurred at the Loy-Lange Box Company in St. Louis, Missouri. The incident occurred when the bottom head of a pressure vessel called a semi-closed receiver (SCR), which was used in the company's steam generation system, catastrophically failed. The SCR was launched in the air as the result of the explosion and landed on a neighboring business. One employee of the Loy Lange Box Company and three members of the public were fatally injured. The U.S. Chemical Safety and Hazard Investigation Board (CSB) investigated this incident and learned during the investigation that the SCR was repaired by an R stamp organization in 2012 five years prior to the incident. During the repair a wasted area of the bottom head of the SCR was flush patched. The cause of the defect was determined to be oxygen pitting corrosion. Evidence gathered during the investigation suggests that the defects in the head were not fully removed during the repair activity. The R stamp organization stated during the investigation that Loy-Lange requested an "emergency repair" following the discovery of a leak from the SCR. The R stamp organization stated further that they interpreted this to mean the repair needed to be completed immediately, presumably so production could resume as normal. To make the repair the R stamp organization cut the SCR shell from the bottom head, leaving the bottom head attached to the skirt. An employee who oversaw the repair stated that they observed pitting corrosion damage in the bottom head. They cut a hole in the center of the head where they believed the corrosion was isolated and applied a flush patch. They believed they removed all corrosion damage through this process. When asked what techniques they relied upon to determine the complete removal of defects the employee replied that they would have been able to see additional pitting and that with the hole cut in the head they were able to match up the patch with the existing metal to verify the thickness of the remaining metal of the head. Besides being able to see differences in the thickness of the patch and the remaining metal of the head, this employee also reported that they would have been able to feel the difference too. Another employee reported measuring the thicknesses of the two pieces with a tape measurer and verified the thickness of both pieces to be 1/4 inch. The evidence the CSB gathered demonstrating the likeliness that repair did not remove all defective material from the SCR is discussed in Section 1.6 SCR Post-Failure Examination starting on page 26 of the report. Had all defective material been removed during this repair the incident may not have happened. Full details of the Loy-Lange Box Company Pressure Vessel Explosion are available at this link: https://www.csb.gov/loy-lange-box-company-pressure-vessel-explosion/ INTERPRETATION 21-13 Subject: Repair of pressure-retaining items without complete removal of defect Edition: 2021 Question: If the characteristics of the defect cannot be fully established, would the provisions of NBIC Part 3, 3.3.4.8 be applicable? Reply: No.

Existing Text

Except as provided in NBIC Part 3, 3.3.4.8, a repair of a defect in a welded joint or base material shall not be made until the defect has been removed. A suitable nondestructive examination (NDE) method, such as magnetic particle (MT) or liquid penetrant (PT), may be necessary to ensure complete removal of the defect. If the defect penetrates the full thickness of the material, the repair shall be made with a full penetration weld such as a double butt weld or single butt weld with or without backing. Where circumstances indicate that the defect is likely to recur, consideration should be given to removing the defective area and installing a flush patch or taking other corrective measures acceptable to the Inspector, and when required, by the Jurisdiction.

Proposed Text

Except as provided in NBIC Part 3, 3.3.4.8, a repair of a defect in a welded joint or base material shall not be made until the defect has been removed. A suitable nondestructive examination (NDE) method, such as magnetic particle (MT) or liquid penetrant (PT), is necessary to ensure complete removal of the defect. Where the cause of the defect is oxygen pitting corrosion, or similar, the remaining thickness of material left behind shall be verified by a suitable nondestructive test such as ultrasonic thickness measurement. If the defect penetrates the full thickness of the material, the repair shall be made with a full penetration weld such as a double butt weld or single butt weld with or without backing. Where circumstances indicate that the defect is likely to recur, consideration should be given to removing the defective area and installing a flush patch or taking other corrective measures acceptable to the Inspector, and when required, by the Jurisdiction.

VOTE:							
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date



PROPOSED REVISION OR ADDITION

Item No. A 23-41
Subject/Title Strengthening Requirements for Defect Removal When Patching
NBIC Location Part: Repairs and Alterations; Section: 3; Paragraph: a)2)
Project Manager and Task Group
Source (Name/Email) Adam Henson / adam.henson@csb.gov
Statement of Need The existing text requires the removal of defective material until sound material is reached but provides no requirements or guidance on means to employ to ensure complete removal of defective material. The means to ensure defects have been removed must be understood by all to ensure safety. There is an interpretation of the 2021 NBIC that compounds this issue permitting repair organizations to not follow the requirements of NBIC Part 3, 3.3.4.8 even when the characteristics of the defect cannot be fully established.
Background Information On April 3, 2017, an explosion occurred at the Loy-Lange Box Company in St. Louis, Missouri. The incident occurred when the bottom head of a pressure vessel called a semi-closed receiver (SCR), which was used in the company's steam generation system, catastrophically failed. The SCR was launched in the air as the result of the explosion and landed on a neighboring business. One employee of the Loy Lange Box Company and three members of the public were fatally injured. The U.S. Chemical Safety and Hazard Investigation Board (CSB) investigated this incident and learned during the investigation that the SCR was repaired by an R stamp organization in 2012 five years prior to the incident. During the repair a wasted area of the bottom head of the SCR was flush patched. The cause of the defect was determined to be oxygen pitting corrosion. Evidence gathered during the investigation suggests that the defects in the head were not fully removed during the repair activity. The R stamp organization stated during the investigation that Loy-Lange requested an "emergency repair" following the discovery of a leak from the SCR. The R stamp organization stated further that they interpreted this to mean the repair needed to be completed immediately, presumably so production could resume as normal. To make the repair the R stamp organization cut the SCR shell from the bottom head, leaving the bottom head attached to the skirt. An employee who oversaw the repair stated that they observed pitting corrosion damage in the bottom head. They cut a hole in the center of the head where they believed the corrosion was isolated and applied a flush patch. They believed they removed all corrosion damage through this process. When asked what techniques they relied upon to determine the complete removal of defects the employee replied that they would have been able to see additional pitting and that with the hole cut in the head they were able to match up the patch with the existing metal to verify the thickness of the remaining metal of the head. Besides being able to see differences in the thickness of the patch and the remaining metal of the head, this employee also reported that they would have been able to feel the difference too. Another employee reported measuring the thicknesses of the two pieces with a tape measurer and verified the thickness of both pieces to be 1/4 inch. The evidence the CSB gathered demonstrating the likeliness that repair did not remove all defective material from the SCR is discussed in Section 1.6 SCR Post-Failure Examination starting on page 26 of the report. Had all defective material been removed during this repair the incident may not have happened. Full details of the Loy-Lange Box Company Pressure Vessel Explosion are available at this link: https://www.csb.gov/loy-lange-box-company-pressure-vessel-explosion/ INTERPRETATION 21-13 Subject: Repair of pressure-retaining items without complete removal of defect Edition: 2021 Question: If the characteristics of the defect cannot be fully established, would the provisions of NBIC Part 3, 3.3.4.8 be applicable? Reply: No.

Existing Text

Before installing a flush patch, defective material shall be removed until sound material is reached. The patch shall be formed to the proper shape or curvature. The edges shall align without overlap. In stayed areas, the weld seams should come between staybolt rows or riveted seams. Patches shall be made from a material whose composition and thickness meet the intended service. Patches may be any shape or size. If the patch is rectangular, a minimum radius of not less than three times the material thickness shall be provided at the corners. Square corners are not permitted. The completed welds shall meet the requirements of the original code of construction.

Proposed Text

Before installing a flush patch, defective material shall be removed until sound material is reached. The soundness of the remaining material shall be verified through nondestructive testing such as ultrasonic thickness measurement testing. The patch shall be formed to the proper shape or curvature. The edges shall align without overlap. In stayed areas, the weld seams should come between staybolt rows or riveted seams. Patches shall be made from a material whose composition and thickness meet the intended service. Patches may be any shape or size. If the patch is rectangular, a minimum radius of not less than three times the material thickness shall be provided at the corners. Square corners are not permitted. The completed welds shall meet the requirements of the original code of construction.

VOTE:							
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date



PROPOSED REVISION OR ADDITION

Item No. A 23-49	
Subject/Title Hardness testing of existing materials	
NBIC Location Part: Repairs and Alterations; Section: 3; Paragraph: 3.2.1 a)	
Project Manager and Task Group	
Source (Name/Email) Mark Kincs / mark.r.kincs@xcelenergy.com	
Statement of Need Field hardness testing of existing materials may be difficult and produce erroneous results. It is usually unnecessary for determining properties required for selection of welding procedures. Unless needed, it should not be required to be performed. The purpose of verifying existing materials in Paragraph 3.2.1 a) is not to confirm acceptability of existing design, but to determine nominal composition for welding.	
Background Information Field hardness testing is often negatively affected by such factors as material thickness, surface preparation, and vibration. Chemical analysis has a clear correlation to selection of proper welding procedures by determining nominal material composition. Hardness testing has no such clear correlation, and Paragraph 3.2.1 a) does not explain its need. If the intent is that the hardness reading be used to approximate material tensile strength for welding considerations, the need for such information is rare.	
Existing Text The materials used in making repairs or alterations shall conform insofar as possible to the original code of construction or construction standard or code selected, including the material specification requirements used for the work planned. Carbon or alloy steel having a carbon content of more than 0.35% shall not be welded unless permitted by the original code of construction. The "R" Certificate Holder is responsible for verifying identification of existing materials from original data, drawings, or pressure-retaining item records, and identification of the materials to be installed. Consideration shall be given to the condition of the existing material, especially in the weld preparation area. If the existing material cannot be verified (unknown), the "R" Certificate Holder shall perform a chemical analysis and hardness testing, as a minimum, of the unknown material to verify its weldability and strength or may elect to qualify a weld procedure. If there is a question with regard to the weldability characteristics of the material, then competent technical advice should be obtained.	Proposed Text The materials used in making repairs or alterations shall conform insofar as possible to the original code of construction or construction standard or code selected, including the material specification requirements used for the work planned. Carbon or alloy steel having a carbon content of more than 0.35% shall not be welded unless permitted by the original code of construction. The "R" Certificate Holder is responsible for verifying identification of existing materials from original data, drawings, or pressure-retaining item records, and identification of the materials to be installed. Consideration shall be given to the condition of the existing material, especially in the weld preparation area. If the existing material cannot be verified (unknown), the "R" Certificate Holder shall, at a minimum, perform a chemical analysis of the unknown material to determine its nominal composition for welding considerations. Hardness testing of the material shall additionally be performed, if required to further discern material properties for weld procedure selection. As an alternative to material testing, the "R" Certificate Holder may elect to qualify a weld procedure using a sample of the material. Competent technical advice should be obtained when there are questions regarding material weldability based on test results. The "R" Certificate Holder shall provide information in the repair package satisfactory to the Inspector regarding material weldability and weld procedure selection.



PROPOSED REVISION OR ADDITION

Item No. A 23-51	
Subject/Title Replace "legal" with "company" in 1.5.1 a) Title Page	
NBIC Location Part: Repairs and Alterations; Section: 1; Paragraph: 1.5.1	
Project Manager and Task Group	
Source (Name/Email) Luis Ponce / lponce@nationalboard.org	
Statement of Need The National Board has not adopted the ASME policy regarding company and legal names. Per the ASME policy it is permissible to have two names on a Certificate of Authorization and the quality manual. The 2023 NBIC 1.5.1 a) "legal" term may cause confusion for certificate holders, their AIAs, and review teams.	
Background Information The ASME Guide on Legal Names is available for review.	
Existing Text The title page shall contain the Certificate Holder's legal name, physical address, and scope of work.	Proposed Text The title page shall contain the Certificate Holder's company name, physical address, and scope of work.

COMMITTEE	VOTE:				Passed	Failed	Date
	Approved	Disapproved	Abstained	Not Voting			