THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD SUBCOMMITTEE REPAIRS AND ALTERATIONS

MINUTES

Meeting of July 15th, 2020
Louisville, KY

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

The National Board of Boiler & Pressure Vessel Inspectors
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1. **Call to Order**
   The meeting was called to order at 8:03 AM by Chairman R. Troutt

2. **Introduction of Members and Visitors**
   Introductions took place amongst all members and visitors, and an attendance sheet was filled out by the Secretary, (**Attachment 1**).

3. **Check for a Quorum**
   With the attached roster and the above noted individual, a quorum was established.

4. **Announcements**
   Secretary Hellman announced the National Board will be hosting a reception for all committee members and visitors on Wednesday evening at 5:30pm in the Bluegrass Ballroom on the 3rd floor of The Brown Hotel.

5. **Adoption of the Agenda**
   Mr. Hellman listed the following changes to the Agenda:
   - Added Interp. Item 20-49,
   - Added Action Items 20-47, 20-48

6. **Approval of the Minutes of the January 15th, 2020 Meeting**
   There was a motion to approve the Minutes of January 15th, 2020 as published. The motion was seconded and unanimously approved.

7. **Review of Rosters**
   a. **Membership Nominations**
      i. The following members were unanimously approved to be appointed to the SG R&A
         - Mr. Trevor Seime (Jurisdictional Authorities),
         - Mr. Scott Chestnut (Users), and
         - Mr. Paul Davis (Manufacturers)
      ii. The following members were unanimously approved to be appointed to the SC R&A and will be voted on by Main Committee:
         - Mr. Robert Underwood (Authorized Inspection Agency)
         - Mr. Trevor Seime (Jurisdictional Authorities),
      iii. Mr. Ray Spuhl (Authorized Inspection Agency) was unanimously approved to be a member of the NR Task Group

   b. **Membership Reappointments**
      i. The following Subgroup R&A memberships were unanimously approved to be reappointed:
         - Mr. Brian Boseo,
         - Mr. Ben Schaefer, and
         - Mr. Rob Troutt.
      ii. The following Subcommittee R&A memberships were unanimously approved to be reappointed:
         - Mr. Rick Sturm.
      iii. The following Graphite Task Group memberships were unanimously approved to be reappointed:
         - Mr. Monte Bost.

iv. The following Locomotive Boilers Task Group were unanimously approved to be reappointed:
- Mr. Charlie Cross,
- Mr. Mark Jordan, and
- Mr. Paul Welch.

v. The following Historical Boilers Task Group memberships were unanimously approved to be reappointed:
- Mr. Jon Wolf.

c. Officer Nominations

i. Mr. Brian Boseo and Mr. Ben Shaefer were both unanimously approved to be reappointed as Chair and Vice Chair, respectively.

8. Interpretations

Item Number: 19-26	NBIC Location: Part 3, 3.3.2	Attachment 2

General Description: Clarification on welding repairs on appendages

Subgroup: Repairs and Alterations
Task Group: P. Shanks – PM

Explanation of Need: The original submitter of this item will sometimes need to perform a welding repair on an appendage (not on the tank itself) in order for the complete process of refurbishment to be done for their customers' expectations. There appears to be no direct reference to these types of minor welding repairs for the refurbishment process in the NBIC code.

January 2020 Meeting Action: Mr. P. Shanks presented, and his proposal was approved by the subcommittee. The Main Committee provided several suggested changes that Mr. Shanks agreed to address for the July 2020 meeting.

Meeting Action: P. Shanks presented. A motion was made, seconded, and unanimously approved to **Close with a response to the inquirer that this is outside the scope of the NBIC**.

Item Number: 20-3	NBIC Location: Part 3, 3.3.4.8	Attachment 3

General Description: Inspector involvement in Fitness-for-Service Assessments

Subgroup: Repairs and Alterations
Task Group: J. Siefert (PM)

Explanation of Need:
The below questions are intended to gain clarity as to first which Inspector (i.e. "IS" Commissioned or "R" Endorsement) signs the FFSA Form NB-403 when an "R" Certificate Holder is involved with a repair in that region as well as determine what level of review of the Fitness-for-Service the Inspector is expected to complete. If it is an Inspector holding a "R" Endorsement with an AI Commission (not tested on NBIC Part 2), shouldn't the relevant pages in NBIC Part 2 concerning Fitness for Service be included in their tested body of knowledge, so they are aware of the detailed rules?

The Body-Of-Knowledge for National Board Inspectors holding either an "IS" Commission or "R" Endorsement does not reference ASME FFS-1/API 579 Fitness-For-Service Standard or have any expectation that the Inspector be capable of determining if the correct Fitness for Service methodology was used or that the assumptions taken by the Engineer in the analysis were the most appropriate or accurate. Clarification is also requested due to the Form NB-403 signature block stating "Verified by" for the Inspector without any other disclaimers as typically found on other Forms signed by Inspectors such as ASME MDRs and NBIC Form R-1/R-2.

January 2020 Meeting Action: Mr. Carter presented the proposal. Mr. Galanes proposed creating a new action item to address FFS assessments in Part 3 as a way to handle this. This was a Progress Report.

Meeting Action: J. Siefert presented that Action Item 20-10 may address this inquire and submitted a **Progress Report** to await the outcome of Item 20-10.

New Interpretation Requests:

Item Number: 20-11	**NBIC Location: Part 3, 3.3.3**	**Attachment 4**

General Description: Scope of Repairs

Subgroup: Repairs and Alterations

Task Group: K. Moore (PM)

Explanation of Need:
NBIC Part 3 lists several examples of repair but nowhere limits the scope or amount of these examples that can be utilized when performing repairs. This creates some uncertainty when performing some types of repairs, such as replacing the tubesheets of a fixed tubesheet type heat exchanger as listed in 3.3.3 e). According to ASME BPV Code Section VIII Division 1 Part UHX, Section 13, the length of the tubes is a design parameter and therefore replacing the tubesheet in accordance with its original design might require the replacement of the tubes as well to maintain the original design length.

Meeting Action: K. Moore presented. Discussion took place on if tubsheet replacement activities may qualify as a Repair or Alteration. Interpretation 17-11 was referenced, and P. Becker indicated that she would be opening a new Action Item to revise the definition of an alteration in 3.4.4 d) for clarification. It was decided that the proposal needs additional work at the TG Interpretation level, and the proposal can be submitted to SC R&A via Letter Ballot once ready. This was a **Progress Report**.

Item Number: 20-14	**NBIC Location: Part 3, 3.3.3 & 5.12.4.1**	**Attachment 5**

General Description: Mechanical Repair with no welding

Subgroup: Repairs and Alterations

Task Group: P. Edwards (PM)

Explanation of Need:
ASME Section VIII, Division 3 Code stamped "Parts" are being replaced with new ASME Code stamped "Parts" without any documentation. The original ASME Data Report listed the original "Part" serial number and will no longer be accurate if the original "Part" is replaced.

Meeting Action: P. Edwards presented a proposal. A motion was made, seconded, and the **proposal was Unanimously Approved.**

Item Number: 20-17	**NBIC Location: Part 3, 3.3.3**	**Attachment 6**

General Description: Weld build of wasted areas with different material

Subgroup: Repairs and Alterations

Task Group: G. Galanes (PM), J. Siefert

Explanation of Need:
It is common practice to weld build the wasted area of a component with original material and then to overlap with a corrosion resistant material to prevent future wasting of the component. It would be more efficient to simply restore the wasted area with the corrosion resistant material, provided that it meets or exceeds the strength requirements of the original material.

Meeting Action: G. Galanes presented a proposal. A motion was made, seconded, the proposal was **Unanimously Approved.**

Item Number: 20-21	**NBIC Location: Part 3, 4.4.1 e)**	**Attachment 7**

General Description: Combination of NDE methods

Subgroup: Repairs and Alterations

Task Group: M. Quisenberry (PM)

Explanation of Need:
Clarification on the intent of 4.4.1 e) 1-5 when using VT and another NDE method but on separate welds.

Meeting Action: J. Siefert presented a proposed reply. The reply is to include an "under the line" comment (not published) to refer the inquirer to Interpretation 11-01 and 98-04. The proposal was motioned, seconded, and **Unanimously Approved**.

Item Number: 20-23	NBIC Location: Part 3, 3.4.5.1 b)	Attachment 8

General Description: Alteration of ASME Section VIII Div.2 vessels

Subgroup: Repairs and Alterations

Task Group: G. Galanes (PM), J. Siefert

Explanation of Need:
Many Div.2 vessels which are in need of repair are of sufficient age whereby all of the original paperwork was paper work. Even with the best efforts such documents can become damaged or lost by the flooding event associated with the gulf coast hurricane events and or the types of refinery fires that are all too common. In a good deal of cases these vessels simply need a new B-16.5 weld neck flange or a gasket surface weld metal build up in order to allow continued leak free surface but due to some documents being unavailable the owner is left to choose between making no repair or making a repair which is not compatible with the NBIC.

Meeting Action: G. Galanes presented a proposal. The proposal was revised after discussion and a motion was made, seconded, and the revised proposal was **Unanimously Approved.**

Item Number: 20-24	NBIC Location: Part 3, 3.3.5.1 a) & 3.4.5.1 a)	Attachment 9

General Description: Certification of repair or alteration plans

Subgroup: Repairs and Alterations

Task Group: B. Morelock (PM)

Explanation of Need:
3.4.5.1 b) allows for the UDS to be revised if a proposed alteration plan is not compatible with the original. this revised UDS must be certified by an engineer as must the Alteration plan, there currently does not appear to be a separation of the two certifying activity's which is not in the spirit of Div.2 requiring different engineers for the UDS and MDR.

Meeting Action: B. Morelock presented a proposal. After discussion, Mr. Morelock decided to open a new Action Item to revise 3.3.5.2 a) and 3.3.5.2 b) to address the P.E. who signs the UDS. (Taskgroup: B. Morelock (PM), R. Troutt, P. Shanks). The proposal was revised and then motioned, seconded, and **Unanimously Approved to Close with a Response to the Inquirer that new Action Item will be opened to address the issue.**

Item Number: 20-29	**NBIC Location: Part 3, 3.4.4**	**Attachment 10**

General Description: PV Cycles of operations change as an alteration

Subgroup: Repairs and Alterations

Task Group: P. Shanks (PM)

Explanation of Need:
Isostatic Presses in particular (but found in other pressure vessels also) are restricted by the data report to a finite number of cycles. Operators of these vessels routinely use curves to modify what is considered a cycle and extend the life of the vessel. These vessels represent a substantial risk of failure and this practice is very difficult for the inservice inspector to successfully track and audit to ensure the integrity of these vessels are maintained as this is a grey area in the current code as written.

Meeting Action: P. Shanks presented a proposal. The proposal was revised after discussion and a motion was made, seconded, and the revised proposal was **Unanimously Approved.**

Item Number: 20-49	**NBIC Location: Part 3, 4.4.2 c)**	**Attachment 11**

General Description: Alternative method in lieu of pressure testing

Subgroup: Repairs and Alterations

Task Group: G. Galanes (PM)

Explanation of Need:
Since contamination of pressure-retaining items by liquids is possible and pressure testing is not practicable for the huge high-pressure vessel to be modified, and NDE is not effective for the planned modification, alternative method to ensure the structural integrity is required.

Meeting Action: G. Galanes presented a proposal. A motion was made, seconded, and the proposal was **Unanimously Approved.**

9. Action Items

Item Number: NB15-1405	NBIC Location: Part 3, 1.2	Attachment 12

General Description: Impact testing of P-11B Material

Subgroup: Repairs and Alterations

Task Group: , P. Davis (PM), G. Galanes, P. Shanks

January 2020 Meeting Action: Mr. N. Carter presented his proposal is intended to go to Review and Comment Letter Ballot to SG R&A. This was a Progress Report.

Meeting Action: G. Galanes presented a proposal. The proposal was revised after discussion and a motion was made, seconded, and the revised proposal was **Unanimously Approved.**

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

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

Subgroup: Graphite
Task Group: Greg Becherer (PM)

January 2020 Meeting Action: No members of the Graphite Task Group were present to discuss the item.

Meeting Action: No members of the Graphite Task Group were present to discuss the item. This was a **Progress Report**.

Item Number: 17-134	NBIC Location: Part 3, Section 5	No Attachment

General Description: Proposed Revision for registration of Form R-1 with the National Board containing ASME pressure part data reports attached.

Subgroup: Repairs and Alterations
Task Group: P. Shanks (PM), Rob Troutt, Joel Amato, Kathy Moore, Paul Edwards

January 2020 Meeting Action: Mr. P. Shanks presented a Progress Report.

Meeting Action: Mr. P. Shanks presented a **Progress Report**.

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

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

Subgroup: Graphite
Task Group: Aaron Viet (PM)

January 2020 Meeting Action: No members of the Graphite Task Group were present to present the item.

Meeting Action: No members of the Graphite Task Group were present to discuss the item. This was a **Progress Report**.

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

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

Subgroup: Graphite

Task Group: C. Cary (PM)

January 2020 Meeting Action: No members of the Graphite Task Group were present to present the item.

Meeting Action: No members of the Graphite Task Group were present to discuss the item. This was a **Progress Report**.

Item Number: 18-100	NBIC Location: Part 3, 3.3.2	Attachment 13

General Description: Revision adding heat exchanger tubes with an outside diameter of ¾" or smaller to NBIC Part 3.3.2 Routine Repairs

Subgroup: Repairs and Alterations

Task Group: M. Toth – PM, B. Schaefer,

January 2020 Meeting Action: Mr. B. Schaefer presented a Progress Report, as this has been reassigned to new Task Group members, (previously Mr. Martinez was PM).

Meeting Action: Mr. M. Toth presented a **Progress Report**.

Item Number: 19-16	NBIC Location: Part 3, 3.3.2 e)	Attachment 14

General Description: Reword to provide clarity; contradictory requirement Part 3; 3.2.2 e)

Subgroup: Repairs and Alterations

Task Group: Tom White (PM)

Explanation of Need: This wording of this clause is causing confusion. The original submitter has had multiple instances where owners have requested to purchase welded replacement parts directly and read this clause with the belief that they can purchase a replacement part for in some cases a welded pressure part for an ASME Section I boiler and safe money by having the fabricator not Hydro test as per Section I even when it was not impractical to have the testing performed.

January 2020 Meeting Action: Mr. P. Edwards presented that Item 19-59 may satisfy the inquirer. Item 19-59 was taken out of order and unanimously approved. A motion to respond to the inquirer of Item 19-16 (Eben Creaser) to see if the revision proposal under Item 19-59 satisfies his request for a Code Revision was made, seconded and unanimously approved.

Update: A letter was sent to Mr. Creaser to see if item 19-59 satisfied his request. Mr. Creaser responded 7/ 8/2020, stating that the wording proposed is "still a bit ambiguous". Mr. Creaser submitted proposed new wording that can be seen on the Cloud.

Meeting Action: T. White presented a **Progress Report**.

Item Number: 19-60	NBIC Location: Part 3, 1.5.1	No Attachment

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

Subgroup: Repairs and Alterations

Task Group: K. Moore (PM), Paul Davis, B. Boseo, M. Toth, P. Shanks, M. Quisenberry, R. Sturm

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

January 2020 Meeting Action: Mr. Boseo commented that Items 19-47 and 19-48 were both closed and the scope for this item expanded to address all elements in 1.5.1. The attached proposal addresses only calibration. New Item 19-82 (Safety Verbiage addition) to be included in this Item's scope. This was a Progress Report.

Meeting Action: Ms. K. Moore presented a **Progress Report**.

Item Number: 19-61	NBIC Location: Part 3, 3.3.4	Attachment 15

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

Subgroup: Repairs and Alterations

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

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

January 2020 Meeting Action: Mr. P. Shanks presented a Progress Report.

Meeting Action: P. Shanks presented a proposal. The proposal was revised after discussion to add select verbiage from PCC-2 into the NBIC instead of referencing PCC-2. A motion to send the revised proposal to the **SG and SC R&A via Letter Ballot** was made, seconded, and **Unanimously Approved.**

Item Number: 19-68	NBIC Location: Part 3, 1.6	No Attachment

General Description: Review 1.6 requirements for ANI's & ANII's to hold the R endorsement

Subgroup: Repairs and Alterations

Task Group: B. Wielgoszinski (PM)

Explanation of Need: Review of 1.6 for possible requirement for ANI's and ANII's to hold the (R) Endorsement for "NR" activities.

January 2020 Meeting Action: Mr. P. Edwards presented a Progress Report.

Meeting Action: B. Wielgoszinski presented a **Progress Report**. Mr. R. Spuhl and Mr. T. Roberts volunteered to help work on this item and were added to the Task Group.

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

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

Subgroup: Graphite

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

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

January 2020 Meeting Action: No members of the Graphite Task Group were present to present the item.

Meeting Action: No members of the Graphite Task Group were present to discuss the item. This was a **Progress Report**.

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

General Description: Routine repair requirements for partial nozzle replacement

Subgroup: Graphite

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

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

January 2020 Meeting Action: No members of the Graphite Task Group were present to present the item.

Meeting Action: No members of the Graphite Task Group were present to discuss the item. This was a **Progress Report**.

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

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

Subgroup: Graphite

Task Group: A. Stupica (PM)

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

January 2020 Meeting Action: No members of the Graphite Task Group were present to present the item.

Meeting Action: No members of the Graphite Task Group were present to discuss the item. This was a **Progress Report**.

Item Number: 19-82	NBIC Location: Part 3, 1.5.1 j)	Attachment 16

General Description: Review verbiage in Part 3, 5.12.5.1 8) and 5.12.5.1.11)

Subgroup: Repairs and Alterations

Task Group: M. Quisenberry (PM)

Explanation of Need: Safety is not addressed in Part 3. This verbiage could be added to the 1.5.1 j) Method of Performing Work paragraph so Certificate Holders can address the safety concerns specific to their scope of activities.

January 2020 Meeting Action: Mr. M. Quisenberry was recently selected as the PM and presented this as a Progress Report. The intent is to add this to the scope of current Action Item 19-60 and close this Item with no action at the next meeting.

Meeting Action: Mr. M. Quisenberry presented this as a **Progress Report**.

New Items:

Item Number: 20-6	**NBIC Location: Part 3, Table 2.3**	**Attachment 17**

General Description: Table 2.3 SWPS - Previous Versions accepted

Subgroup: Repairs and Alterations

Task Group: J. Sekely (PM)

Explanation of Need: The use of previous versions of the Designated SWPS is permitted. Previous versions include those reaffirmed, revised, or amended SWPSs regardless of publication date. The AWS reaffirms, amends or revises SWPSs in accordance with ANSI procedures. This Code addition will simplify the maintenance of Table 2.3.

Update: This has been approved by the SC, and the Review and Comment ballot raised no concerns from Main Committee.

Meeting Action: Secretary Hellman presented the original proposal that has been revised to incorporate additional reaffirmation dates and editorial changes to align the NBIC with the actual description verbiage on the SWPS abstracts. The revised/updated proposal is to be voted at SG, SC, and Main Committee. A motion was made, seconded, and the revised proposal was **Unanimously Approved.**

Item Number: 20-7	**NBIC Location: Part 3, 3.3.2 a)**	**Attachment 18**

General Description: Routine repairs of Div.2 & or Div.3 vessels

Subgroup: Repairs and Alterations

Task Group: B. Morelock (PM)

Explanation of Need: An interpretation is scheduled to be issued under item number 19-26 asserting that Routine repairs are not to be used on Div.2 or Div.3 vessels. rather than require review of an interpretation which may expire in two years the body of the code should make it clear that Routine repairs are not compatible with div.2 or div.3 vessels.

Meeting Action: P. Shanks presented a proposal. A motion was made, seconded, and the proposal was **Unanimously Approved**.

Item Number: 20-8	**NBIC Location: Part 3, 8.1 b)**	**Attachment 19**

General Description: Interpretation revision process

Subgroup: Repairs and Alterations

Task Group: K. Moore (PM)

Explanation of Need: Adding language to specify that interpretations of previous NBIC editions are applicable to the most current edition, as long as code requirements have not changed.

Meeting Action: K. Moore presented that this Item can be closed if the NBIC Introduction is revised to address the use of Interpretations as proposed in this Action Item. This will be considered a **Progress Report** until the revised Introduction can be reviewed and this Action Item can be closed.

Item Number: 20-9	**NBIC Location: Part 3, 9.1**	**Attachment 20**

General Description: Define "Verify" and "Witness" in the NBIC Glossary

Subgroup: Repairs and Alterations

Task Group: K. Moore (PM)

Explanation of Need: Defining "Verify" and "Witness" in the NBIC Part 1, 2, 3, and 4 to align with the definition in NB-263, RCI-1, Rules for Commissioned Inspectors.

Meeting Action: K. Moore presented a proposal. The proposal had been sent to all Subgroups for comment and consideration. Discussion took place regarding the Part 2 Subgroup's proposed revision to this Item to address "remote inspection". The consensus of the Part 3 Subgroup was to use the definition from RCI-1 as originally proposed. A motion was made, seconded, and the original proposal was **Unanimously Approved**.

Item Number: 20-10	NBIC Location: Part 3, New Supplement	Attachment 21

General Description: Develop a new Supplement to address rules and roles for FFS

Subgroup: Repairs and Alterations

Task Group: J. Siefert (PM)

Explanation of Need: Currently, the NBIC 3.3.4.8 provides for fitness for service for defects left in a pressure retaining item. It is proposed to develop a new Supplement to provide guidance in how to conduct FFS and roles and responsibilities unique to Part 3 concerning defects.

The current FFS form resides in Part 2 and can deal with in-service condition assessment and is loosely tied to defects in Part 3.

Meeting Action: J. Siefert presented a proposal. Mr. Siefert stated he intended to open two more Action Items to create a Supplement to address FFSA (Form NB-403) guidance. Part 2 is to be included. A motion was made, seconded, and the proposal was **Unanimously Approved**.

Item Number: 20-15	NBIC Location: Part 3, 3.3.2 & 5.7.2	Attachment 22

General Description: Stamping requirements for routine repairs

Subgroup: Repairs and Alterations

Task Group: R. Troutt (PM), K. Moore

Explanation of Need: This would offer traceability to the R-Stamp holder responsible for the work.

Meeting Action: R. Troutt presented a proposal. A motion was made, seconded, and **Unanimously Approved to send the proposal to SG and SC R&A via concurrent Letter Ballots**

Item Number: 20-16	NBIC Location: Part 3, 3.4.4	Attachment 23

General Description: Rules to address re-cold stretching of vessels built to Appendix 44 rules

Subgroup: Repairs and Alterations

Task Group: P. Shanks (PM)

Explanation of Need: ASME Section VIII Div.1 Mandatory Appendix 44 paragraph 44-6.2(g) clearly sets out that a vessel built to those rules needs to be re-stretch having had repair welding. it is not clear if ASME are referring to in process (at the original manufactures location) repairs or post construction repairs. However as the NBIC is currently silent this potential issue should be addressed.

Meeting Action: P. Shanks presented a proposal. The proposal was revised after discussion and a decision was made that the proposal needed more work and the PM should ask the submitter of the revision request to attend the next meeting to provide more information on this. This was considered a **Progress Report.**

Item Number: 20-20	NBIC Location: Part 3, 3.2.2 e)	Attachment 24

General Description: Revision to Part 3, 3.2.2 e)

Subgroup: Repairs and Alterations

Task Group: P. Davis (PM)

Explanation of Need: The certificate holder should not have to explain or justify why a part was not pressure tested in the manufacturing stage. PG-106.8 of Section I allows the part to be fabricated and shipped as such therefore no explanation should be required.

Meeting Action: P. Davis presented a **Progress Report.**

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

General Description: Repair Procedure for Fire Boxes

Subgroup: SG Historical

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

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

January 2020 Meeting Action:
Progress Report: Robert Bryce presented this item to the group. He explained the need for new wording to address repair procedures for fire boxes. L. Moedinger noted that this has been addressed in TG Locomotive (Part 3, S1.2.11.5 & Figure S1.2.11.5-c1). After discussion, the group decided to create a task group to create a proposal for the July 2020 meeting.

Meeting Action: This was a **Progress Report.**

Item Number: 20-28	NBIC Location: Part 3, 2.2.1	Attachment 25

General Description: Qualification of welding procedures by multiple organizations.

Subgroup: Repairs and Alterations
Task Group: B. Boseo (PM)

Explanation of Need: The attached Section IX proposal has been approved for publication by the ASME board. While Section IX provides basis for these tests, it also requires that the ruling Code of Construction expressly permits this activity.

Meeting Action : B. Boseo presented a proposal. The proposal was discussed and there were concerns that Section I has not accepted this Section IX proposal, however, the majority of the Subcomittee felt that the NBIC should address these qualification of welding procedures by multiple organizations prior to the 2021edition since these requirements will be in the 2021 edition of Section IX. A motion was made, seconded, and the proposal was **Approved** with one Abstention (R. Troutt) and two Disapprovals (P. Shanks and K. Moore). NOTE: Email from P. Shanks hours after the meeting indicated his intent to change his vote from “Disapprove” to “Approve”.

Item Number: 20-47	NBIC Location: Part 1, 2, 3, 4 - 9.1	No Attachment

General Description: Revision of the definition of ANIA in Section 9 of all Parts

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

Explanation of Need: ANIA can be revised to clarify requirements and activities of AIA's performing NR inspection activities. After discussion of ANI endorsement requirements per Item 19-68, a revision of "ANIA" is being considered as a way to provide clarity on the ANI and ANIA requirements.

Meeting Action: R. Spuhl presented a **Progress Report**.

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

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

Subgroup: Repairs and Alterations
Task Group: B. Wielgoszinski (PM).

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

Meeting Action: B. Wielgoszinski presented a **Progress Report**.

10. Future Meetings

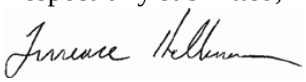
January 11th – 14th, 2021 – New Orleans, LA

July 12th – 15th, 2021 – Cincinnati, OH

11. Adjournment

There being no further business before the Subcommittee, the Chair adjourned the meeting at 11:56 AM, without objection.

Respectfully submitted,



Terrence Hellman
Subcommittee R&A Secretary

SC R&A

First Name	Last Name	Interest Category	Role	In Person	WebEx
Robby	Troutt	Jurisdictional Authorities	Chair		✓
Kathy	Moore	National Board Certificate Holders	Vice Chair		✓
Terrence	Hellman		Secretary	✓	✓
Patricia	Becker	National Board Certificate Holders	Member		✓
Brian	Boseo	National Board Certificate Holders	Member		✓
Paul	Edwards	National Board Certificate Holders	Member		✓
Craig	Hopkins	National Board Certificate Holders	Member		✓ SBW
Timothy	McBee	Authorized Inspection Agencies	Member	✓	
Ray BMC	Miletti Cutler	Manufacturers	Member	—	—
Linn	Moedinger	Users	Member		✓
Brian	Morelock	Users	Member		—
Michael	Quisenberry	National Board Certificate Holders	Member	✓	
Benjamin	Schaefer	National Board Certificate Holders	Member		✓
James	Sekely	General Interest	Member		✓
Paul	Shanks	Authorized Inspection Agencies	Member		✓
John	Siefert	General Interest	Member		✓
Rick	Sturm	Jurisdictional Authorities	Member		✓ —
Marty	Toth	General Interest	Member	✓	
Amir	Khassassi		Visitor		✓
BMC	Cutler	for Ray Miletti	Visitor		✓

DH			Visitor		
Don	Bunny		Visitor		✓
George	Gaines		Visitor		✓
Jamie	Walker		Visitor		✓
Lynn	Moedinger		Visitor		✓
Marty	Sims		Visitor		✓
Phelps	Gilston		Visitor		✓
Rod	Shanks		Visitor		✓
Robert	McGuire		Visitor		✓
Tom	White		Visitor		✓
Walt	Lacy		Visitor		✓
Chris	Cantrell		Visitor		✓
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Interpretation IN19-26

Proposed Interpretation

Inquiry:	IN19-26
Source:	Doug Biggar
Subject:	NBIC Part 3 Section Part 3, 3.3.2
Edition:	[Current/all]
General Description:	Repair of none pressure boundary parts
Question 1:	If a welding repair is done to an appendage of a horizontal ASME LPG pressure vessel such as a faulty leg or the raised data plate holder, is this considered routine and are we exempt to have an inspector present to witness it and/or fill out a specialized form?
Reply 1:	No inspector needs to be present as the welding is not performed on any part of the pressure vessel directly related to its performance under pressure.
Question 2:	What is the minimum length of an appendage we can weld onto without being an ASME/NBIC certified welder (only a standard welding ticket)?
Reply 2:	1/4”
Committee’s Question 1:	Are refurbishment activities such as shot blasting, thread cleaning and painting considered within the scope of the NBIC?
Committee’s Reply 1:	No
Rationale 1:	These activities should not affect the pressure retaining integrity of the item, per the introduction to the NBIC that (maintenance) is the function of the NBIC. Reasonably these activities fall outside the scope of the NBIC
Committee’s Question 2:	Do welding activities on items which have neither a pressure retaining or load bearing function fall within the scope of the NBIC
Committee’s Reply 2:	No.
Rationale:2	These welds are such that typical ASME BPV construction codes would not dictate the qualification of the welders or welding operators.
NBIC Vote	

Include in response letter: NA

Rationale:

Having emailed the enquirer to determine the scope of their typical operations it was clear that there was a general misunderstanding about the purpose of the NBIC, the proposed questions are overly specific and as sure fail to grasp the crux of the issue hence the question re-write. Q3 was added to ensure that no misunderstand occurs. With the exception of a very hardline reading on Section 3.3.2 a) the NBIC addresses in the main body and the introduction the pressure retaining capability of the item and not work conducted elsewhere.

Sections 3.3.2 e), 3.3.3 & 3.4.4 address working (welding / replacing) on components which have a pressure retaining function. Pipes, tubes, heads, shell, and tube sheet are mentioned, integral parts without pressure retaining function such as legs and davit arms are not addressed.

Section 3.3.3 a) can be read as "Weld repairs ~~or replacement of pressure parts or~~ of (sic) attachments that have failed in a weld or in the base material;"

PROPOSED INTERPRETATION

Inquiry No.	**20-3**
Source	Nathan Carter, HSB nathan_carter@hsb.org
Subject	Inspector involvement in Fitness-for-Service Assessments **Background:** The below questions are intended to gain clarity as to first which Inspector (i.e. "IS" Commissioned or "R" Endorsement) signs the FFSA Form NB-403 when an "R" Certificate Holder is involved with a repair in that region as well as determine what level of review of the Fitness-for-Service the Inspector is expected to complete. If it is an Inspector holding a "R" Endorsement with an AI Commission (not tested on NBIC Part 2), shouldn't the relevant pages in NBIC Part 2 concerning Fitness for Service be included in their tested body of knowledge, so they are aware of the detailed rules? The Body-Of-Knowledge for National Board Inspectors holding either an "IS" Commission or "R" Endorsement does not reference ASME FFS-1/API 579 Fitness-For-Service Standard or have any expectation that the Inspector be capable of determining if the correct Fitness for Service methodology was used or that the assumptions taken by the Engineer in the analysis were the most appropriate or accurate. Clarification is also requested due to the Form NB-403 signature block stating "Verified by" for the Inspector without any other disclaimers as typically found on other Forms signed by Inspectors such as ASME MDRs and NBIC Form R-1/R-2. An example is a R-Certificate holder was hired to repair a weld seam. It was discovered during a repair that multiple base metal laminations existed adjacent to the repair location. A Fitness for Services Evaluation was subsequently performed. The first question is whether or not it is the responsibility of the Repair Inspector to sign the FFSA form once everything has been properly vetted, since the defect being left in place is not necessarily within the scope of the initial repair being performed by the "R" Certificate Holder, or should this be signed off by a Commissioned Inservice Inspector, since they are examined on the rules of NBIC Part 2? Also, Form NB-403 is vague in the signature block region for the scope of what the Inspector is signed for. It could be alluded that without a statement, such as those found on the R-1 and R-2 forms, the Inspector is signing off on the appropriateness and adequacy of the Fitness-For-Service methodology performed by the Engineer.
Edition	2019; Part: Repairs and Alterations; Section: 3; Paragraph: 3.3.4.8 2019; Part: Inspection; Section: 4; Paragraph: 4.4
Question	Question 1: In accordance with NBIC Part 3, 3.3.4.8, a fitness-for-service condition assessment as described in NBIC Part 2, 4.4 shall be completed and adequately documented on the FFSA Form NB-403. Once Form NB-403 is completed, is it required that the Inspector signing this Form hold a National Board "R" Endorsement as described in RCI-1/NB-263? Question 2: NBIC Part 2 4.4.1 d) states that the Inspector shall indicate acceptance of the Report of FFSA by signing. Paragraph 4.4.3 b) states that the Inspector shall review the condition assessment methodology and ensure that the inspection data and documentation are in accordance with Part 2. Is the Inspector's signature on Form NB-403 an indication that the condition assessment and recommendations completed by the Engineer have been fully reviewed for appropriateness and accuracy by the Inspector?

	Question 3: If the answer to Question 2 is No, is the Inspector's signature on Form NB-403 an indication of acceptance solely on the basis of review of the Form for completeness and verification that the requirements outlined in 4.4 were addressed?
Reply	Proposed Reply 1: Yes Proposed Reply 2: No Proposed Reply 3: Yes
Committee's Question	
Committee's Reply	
Rationale	

PROPOSED INTERPRETATION

Inquiry No.	**20-11**
Source	Hugh-Jean Nel, Sasol Hugh-Jean.Nel@sasol.com
Subject	Scope of Repairs **Background:** Historically NBIC has not defined limitations on the scope of repair provided the entire item is being rebuilt, see Question & Reply 2 & 3 in Interpretation 98-28. NBIC Part 3 lists several examples of repair but nowhere limits the scope or amount of these examples that can be utilized when performing repairs. This creates some uncertainty when performing some types of repairs, such as replacing the tubesheets of a fixed tubesheet type heat exchanger as listed in 3.3.3 e). According to ASME BPV Code Section VIII Division 1 Part UHX, Section 13, the length of the tubes is a design parameter and therefore replacing the tubesheet in accordance with its original design might require the replacement of the tubes as well to maintain the original design length.
Edition	2019; Part: Repairs and Alterations; Section: 3; Paragraph: 3.3.3 Examples of Repairs
Question	Question: Is it permissible for repair activities performed on pressure retaining item to have more than one activity listed in 3.3.3 with the scope of repair?
Reply	Proposed Reply: Yes, ~~provided that the scope of repairs has been approved by the Inspector, and when required, by the Jurisdiction.~~
Committee's Question 1	~~Can~~ May multiple repair activities referenced in 3.3.3 of Part 3 be listed on a single Form R-1 Report when performing a repair on a pressure retaining item?
Committee's Reply	Yes
Rationale	There is nothing in the NBIC that restrict the repair work performed on one vessel at the same time.
Committee's Question 2	Other than tube plugging, ~~I~~is it considered an alteration when the heat transfer surface(s)~~tube length~~ of a heat exchanger is ~~changed~~ changed from its original design~~while replacing tube sheets~~ on a ~~ASME~~ ~~Section VIII, Div 1~~ pressure vessel?
Committee's Reply	Yes~~.~~ Reference NBIC Part 3,. 3.4.4 d)
Rationale:	~~The tube length is a dimension as mentioned in 3.4.4. d~~

Interp 20-11

3.4.4 EXAMPLES OF ALTERATIONS

d) A change in the dimensions or contour of a pressure-retaining item;

3.3.3 EXAMPLES OF REPAIRS

e) Replacement of heat exchanger tubesheets in accordance with the original design;

INTERPRETATION 98-28

Subject: RC-1050(c) Replacement Parts Fabricated by an "R" Certificate Holder
Appendix 6 Pressure Retaining Replacement Items
RC-1050 Definition of New Replacement Parts

1998 Edition

Question 1: Does RC-1050(c) of the NBIC permit the holder of an "R" Certificate to fabricate by welding new and exact pressure retaining replacement parts for an ASME stamped item that the "R" stamp holder is repairing?

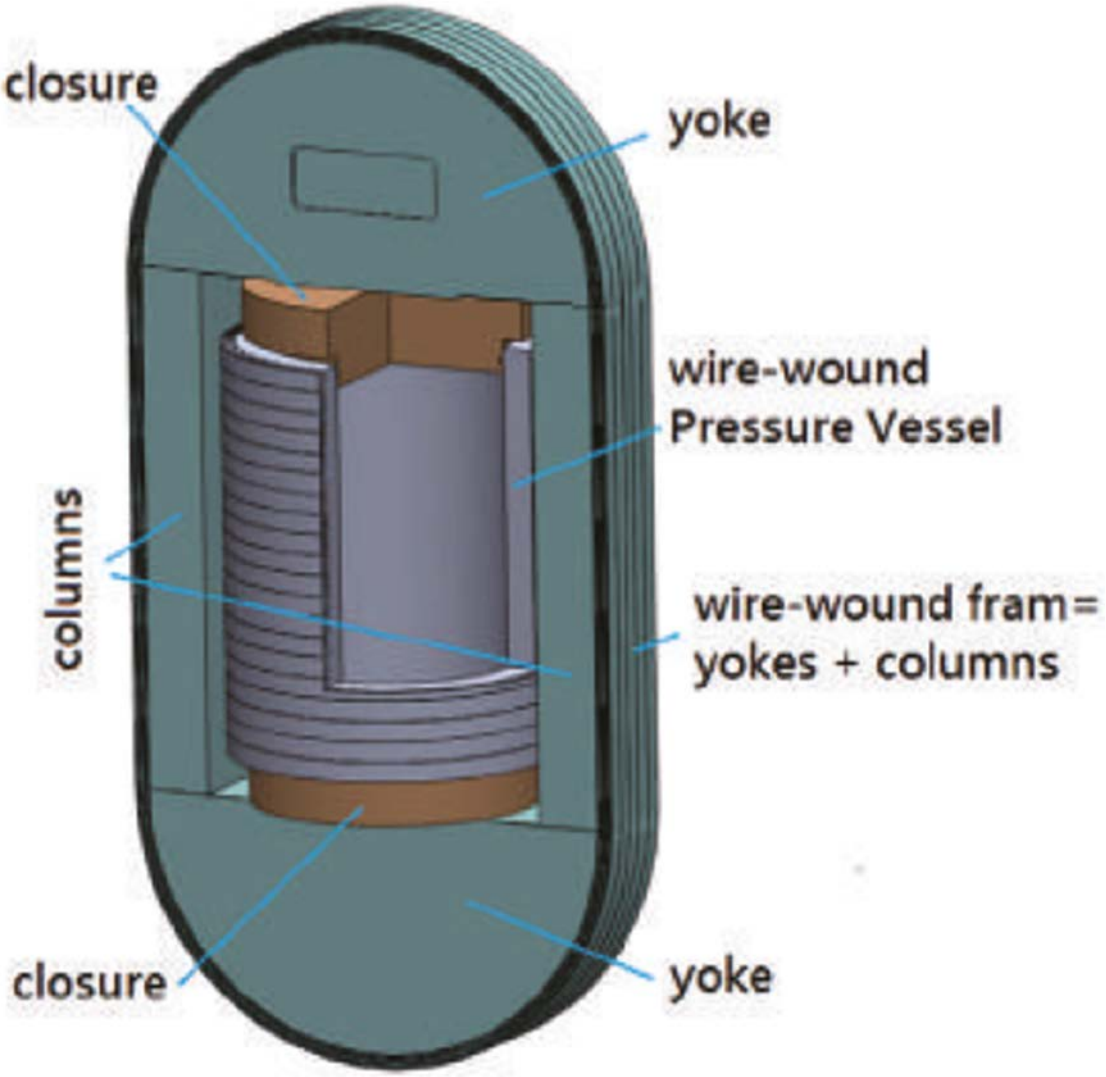
Reply 1: No. ASME replacement parts fabricated by welding that require shop inspection by an Authorized Inspector shall be fabricated by an organization having an appropriate ASME Certificate of Authorization.
Question 2: An ASME stamped item is determined to be corroded beyond repair and the only salvageable part is the ASME Code stamping or nameplate. Is it the intent of the NBIC to permit a holder of an "R" Certificate only to build a complete new and exact pressure retaining replacement item using the original ASME construction Code, Section, Edition and Addenda and same materials, transfer and document the transfer of the ASME stamping or nameplate on an R-1 Form to the new pressure-retaining item and stamp the repair with the "R" stamp?
Reply 2: No.
Question 3: Does the NBIC define the point at which a repair becomes new construction?
Reply 3: No.

PROPOSED INTERPRETATION

Item No. **20-14**	Mechanical Installation of Replacement Parts in ASME Section VIII Division 3 Pressure Vessels
Source	Monte Bost, monte_bost@hsb.com, 937-620-3676
Subject	Part 3, Section 3.2.2, 3.3.3, and 5.12.4.1, Installation of Replacement of Parts Without Welding
Edition	2019
Question	Q1: A Section VIII, Division 3 pressure vessel is made without welding from machined forgings. The pressure retaining components consist of a cylinder, end closures and a frame that holds the end closures in place. If one of the pressure retaining components is replaced with a new ASME-stamped "Part", is this activity considered a repair? Q2: For the repair described in Question (1) above, how shall Line 7, "REPAIR TYPE" be indicated on the Form R-1, *Report of Repair*?
Proposed Reply	R1: Yes R2: Indicate "Type of Repair: Mechanical" in Line 10 "Remarks".
Committee's Question	Q1: An ASME Section VIII, Division 3 pressure vessel is made without welding from machined forgings. The pressure retaining components consist of a cylinder, end closures and a frame that holds the end closures in place. Is replacement of one of the pressure retaining components with a new ASME-stamped "Part" considered a repair? Q2: For the repair activity described in Question 1, does indication of "Mechanical Repair" in Line 10 Remarks of Form R-1 meet the requirements for identification of Repair Type in Line 7 of Form R-1?
Committee's Reply	R1: Yes, see Part 3, 3.3.3.h R2: Yes.
Rationale	The definition of "Mechanical Assembly" in Part 3, Section 9, includes language related to restoration of the pressure retaining boundary. The examples of repairs described in Part 3, 3.3.3.h involving use of replacement parts are not limited to installation by welding. Per Part 3, Section 1.5.1.h, the Quality System shall include controls for repairs and alterations, including mechanical assembly, as applicable. Per Part 3, Section 5.12.4.1, use of the Remarks Section on Form R-1 is available to include supplemental information not otherwise covered on the form.
SC Vote	
NBIC Vote	
Negative Vote Comments	

Background / Explanation of Need

A Section VIII, Division 3 pressure vessel is made from machined forgings with no welding. The pressure retaining items are a cylinder, end closures and a frame that holds the end closures in place. A sketch is provided.



The original ASME Data Report does not reflect the correct “Part” serial number when it is replaced with no documentation. ASME Section VIII, Division 3 Code stamped "Parts" are being replaced with new ASME Code stamped "Parts" without any documentation. The original ASME Data Report listed the original "Part" serial number and will no longer be accurate if the original "Part" is replaced.

PROPOSED INTERPRETATION

Inquiry No.	**20-17**
Source	Roy Darby, Chevron Products Company roy.darby@chevron.com
Subject	Weld build of wasted areas with different material **Background:** It is common practice to weld build the wasted area of a component with original material and then to overlap with a corrosion resistant material to prevent future wasting of the component. It would be more efficient to simply restore the wasted area with the corrosion resistant material, provided that it meets or exceeds the strength requirements of the original material. This represents cost savings for industry with no expected downside.
Edition	2019; Part: Repairs and Alterations; Section: 3; Paragraph: 3.3.3 Examples of Repairs and 3.3.4.3 Wasted Areas
Question	Question: Would it be acceptable as a repair to weld build wasted areas with a material of different nominal composition and, equal to or greater in ultimate 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 would be at least equal to the thickness stated on the original Manufacturer's Data Report. This would be an amalgamation of 3.3.3 (c),(d), and (r) into a single activity.
Reply	Proposed Reply: Yes.
Committee's Question	May the use of a corrosion resistant filler metal of different chemical composition but of equal strength as that of the base metal for a pressure retaining item be ~~used for weld repair of wasted areas~~ considered a repair?
Committee's Reply	No
Rationale	Under examples of repair in 3.3, these are provided as specific examples of repair and as such the 2019 Edition of the NBIC does not specifically address this type of weld repair, as an example. ~~This is consulting.~~

PROPOSED INTERPRETATION

Inquiry No.	**20-21**
Source	Eric Feeney, TEI Construction Services efeeney@teiservices.com
Subject	Nondestructive Examination **Background:** When a boiler outage is being performed, there may be 50-10,000+ welds made. We are accustomed to performing 100% volumetric examination when a hydrostatic test is not being performed. Some of our inspectors suggest that we can perform a portion of the NDE as volumetric and the remainder as VT. When I read 4.4.1 e) it seems to have validity, but I generally have understood paragraph e) to have been referring to each individual weld and not the repair as a whole. This is what I would like clarification on.
Edition	2019; Part: Repairs and Alterations; Section: 4; Paragraph: 4.4.1 e)
Question	Question: May a portion of a repair be subject to NDE other than visual, and the remainder of the repair be subject to exclusive use of VT in accordance with Part 3, 4.4.1 e)?
Reply	Proposed Reply: Yes.
Committee's Question	**Question:** ~~Routine weld repairs are being performed to pressure retaining parts of an ASME B&PV Code Section I boiler.~~ May exclusive use of VT be performed in accordance with Part 3, 4.4.1 e) when pressure testing or alternative NDE methods other than visual examination, are not practicable~~.~~?
Committee's Reply	**Proposed Reply:** ~~Yes~~No, except as permitted for Routine Repairs.~~.~~ UNDER THE LINE COMMENT (not published): Please refer to Interpretations 11-01 and 98-04
Rationale	NBIC Part 3, 4.2 a) specifically limits substitution of alternative NDE methods to situations where NDE to the original code of construction is not possible or practicable. The inquirer is referred to Interpretation 17-01 regarding clarification of the term 'practicable.' NBIC Part 3, 4.4.1 e) 1) specifically limits any substitution of NDE with VT to routine repairs. Routine repairs are defined in NBIC Part 3, 3.3.2 e). NBIC Part 3, nor the original Code of Construction, specify the number or type of preferred NDE that must be performed for a weld repair. This is a contractual agreement that is outside the scope of NBIC Part 3.

Relevant Background

4.2 NONDESTRUCTIVE EXAMINATION

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

4.4.1 TEST OR EXAMINATION METHODS APPLICABLE TO REPAIRS (19)

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.

e) Nondestructive Examination (NDE)

NDE may be conducted. NDE methods used shall be suitable for providing meaningful results to verify the integrity of the repair. Exclusive use of visual examination (VT) is only permitted with the following considerations:

1) When a pressure test or alternative NDE methods other than visual examination, are not practicable the exclusive use of direct VT as an NDE method shall be limited to routine repairs, as identified in NBIC Part 3, 3.3.2.

2) For each repair being considered, the exclusive use of direct VT as an NDE method shall be acceptable to the Inspector, and where required, the Jurisdiction.

3) As a minimum, direct VT shall be performed after the root weld layer or first-pass is deposited, and the final weld surface. Other weld layers shall be examined as identified by the Inspector and, where required, the Jurisdiction.

4) Personnel completing direct VT shall be qualified and certified in accordance with paragraph NBIC Part 3, 4.2- b), AWS QC-1, or any nationally recognized standard acceptable to the Jurisdiction. Visual acuity shall be demonstrated using as a minimum, standard J-2 letters on standard Jaeger test type charts for near vision.

5) Direct VT shall be performed in accordance with a written procedure meeting the procedure and reporting requirements listed in the original code of construction or ASME Section V, Article 9.

Part 3, Section 9, Glossary of Terms
Repair — The work necessary to restore pressure-retaining items to a safe and satisfactory operating condition. (Would seem to imply that 'repair' can include one or more welds repairs)

INTERPRETATION 01-40

Subject: RC-2051(e), RC-3031(c), RC-2050, RC-3030(c)
2001 Edition with 2003 Addendum

Question: If pressure testing is not practicable and if concurrence of the owner, Inspector and jurisdiction is obtained where applicable, may the Visual Testing (VT) NDE method be used to satisfy the NBIC requirement?

Reply: Yes.

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.

PROPOSED INTERPRETATION

Inquiry No.	**20-23**
Source	Paul Shanks, OneCIS Paul.shanks@onecis.com
Subject	Alteration of ASME Section VIII Div.2 vessels **Background:** Many Div.2 vessels which are in need of repair are of sufficient age whereby all of the original paperwork was paper work. Even with the best efforts such documents can become damaged or lost by the flooding event associated with the gulf coast hurricane events and or the types of refinery fires that are all too common. In a good deal of cases these vessels simply need a new B-16.5 weld neck flange or a gasket surface weld metal build up in order to allow continued leak free surface but due to some documents being unavailable the owner is left to choose between making no repair or making a repair which is not compatible with the NBIC. **Explanation of Need:** 3.3.5.2 & 3.4.5.1 both require that a repair or alteration for div.2 vessels are checked for compatibility with the original UDS which is clearly best practice for these higher stressed vessels, however a great deal of work needed on these vessels no doubt due to the higher level of engineering examination during initial fabrication is limited to fixing the problems that come form leaking gaskets i.e. corrosion on gasket faces which may require weld metal build up less than 20"2 or replacement of an ASME standard flange like for like. The professional engineer whom must review and sign for repair plans is qualified to review the service history and/or whatever original documentation is available and determine if a simple flange replacement or weld metal build up is acceptable or not.
Edition	2019 NBIC, Part 3, 3.4.5.1 b)
Question	Question: Given that Paragraph 3.4.5.1 b) allows for the User Design Specification (UDS) to be revised in the case where a proposed alteration is not compatible with the existing UDS is it unacceptable in cases where the original UDS is not available to generate a new UDS which is compatible with the design load case included with the original Manufactures Design Report?
Reply	Proposed Reply: No.
Committee's Question	In Part 3, 3.4.5.1 b) for an ASME Section VIII, Div 2 or Div 3 vessel, may an R-Certificate holder generate a replacement User Design Specification (UDS) in the event the original UDS was lost/destroyed?
Committee's Reply	No.
Rationale	The UDS is a unique document that contains the User's specific information regarding design conditions of the Div 2 or Div 3 vessel. Revising an existing UDS is not the same as generating a completely new UDS if the original was lost.

PROPOSED INTERPRETATION

Inquiry No.	**20-24**
Source	Paul Shanks, OneCIS Paul.shanks@onecis.com
Subject	**Certification of repair or alteration plans** **Background:** NBIC Part 3 3.3.5.2 a) requires the repair plan to be reviewed and certified to ensure the work involved is compatible with the User's Design Specification (UDS) and the Manufacturer's Design Report (MDR). 3.4.5.1 b) allows the UDS to be revised if a proposed alteration plan is not compatible with the original UDS. This revised UDS must be certified by an engineer as well as the alteration plan. Currently, NBIC Part 3 does clarify the separation of the two certifying activities which is not in the spirit of ASME Section VIII, Division.2 requiring different Certifying Engineers for the UDS and MDR.
Edition	2019 NBIC, Part 3 3.3.5.2 a) and Part 3, 3.4.5.1 b)
Question	Question: Is it acceptable for the repair plan or alteration plan to be certified by one of the same engineers that certified the UDS, Revised UDS or MDR?
Reply	Proposed Reply: No.
Committee's Question 1	**May the Certifying Engineer who certified the MDR or UDS of an ASME Section VIII Division 2 or 3 pressure retaining item (PRI) certify the repair plan?**
Committee's Reply 1	**Yes**
Committee's Question 2	**May the Certifying Engineer who certified the MDR or UDS of an ASME Section VIII Division 2 or 3 PRI certify the alteration plan or the revised UDS?**
Committee's Reply 2	**Yes**
Committee's Question 3	**May the Certifying Engineer who certified the revised UDS certify the alteration plan on an ASME Section VIII Division 2 or 3 PRI.**

Committee's Reply 3	**No**
Rationale	**ASME Section VIII, Division 2** **ANNEX 2-A** **GUIDE FOR CERTIFYING A USER'S DESIGN SPECIFICATION** **2-A.2 CERTIFICATION OF THE USER'S DESIGN SPECIFICATION** **2-A.2.1** When required by 2.2.1.1 or 2.2.1.2, certification of the User's Design Specification requires the signature(s) of one or more Certifying Engineers with requisite experience and qualifications as defined in Annex 2-J. The Certifying Engineer(s) shall certify that the User's Design Specification meets the requirements of 2.2.2. *(a)* The Certifying Engineer(s) shall prepare a statement to be affixed to the document attesting to compliance with the applicable requirements of the Code (see 2-A.2.3). *(b)* This Certifying Engineer shall be other than the Certifying Engineer who certifies the Manufacturer's Design Report, although both may be employed by or affiliated with the same organization. *(c)* The Certifying Engineer shall identify the location and authority under which he or she has received the authority to perform engineering work stipulated by the user in the User's Design Specification. **2-A.2.2** When more than one Certifying Engineer certifies and signs the User's Design Specification the area of expertise shall be noted next to their signature under "areas of responsibilities" (e.g., design, metallurgy, pressure relief, fabrication). In addition, one of the Certifying Engineers signing the User's Design Specification shall certify that all elements required by this Division are included in the Specification. **2-A.2.3** An example of a typical User's Design Specification Certification Form is shown in Table 2-A.1. **ANNEX 2-B** **GUIDE FOR CERTIFYING A MANUFACTURER'S DESIGN REPORT** **2-B.2 CERTIFICATION OF MANUFACTURER'S DESIGN REPORT BY A CERTIFYING ENGINEER** **2-B.2.1** When required by either 2.3.3.1(a) or 2.3.3.2, certification of the Manufacturer's Design Report requires the signature(s) of one or more Certifying Engineers with requisite experience and qualifications as defined in Annex 2-J. The Certifying Engineer(s) shall certify that the Manufacturer's Design Report meets the requirements of 2.3.3. *(a)* The Certifying Engineer(s) shall prepare a statement to be

affixed to the document attesting to compliance with the applicable requirements of the Code (see 2-B.4).
(b) This Certifying Engineer shall be other than the Certifying Engineer who certifies the User's Design Specification, although both may be employed by or affiliated with the same organization.
(c) The Certifying Engineer shall identify the location and authority under which he or she has reached the authority to perform engineering work stipulated by the user in the User's Design Specification.
2-B.2.2 When more than one Certifying Engineer certifies and signs the Manufacturer's Design Report, the area of expertise shall be noted next to their signature under "areas of responsibilities" (e.g., design, metallurgy, pressure relief, fabrication). In addition, one of the Certifying Engineers signing the Manufacturer's Design Report shall certify that all elements required by this Division are included in the Report.

Here is an older interpretation from ASME Section VIII, Division 2 as well:

Standard Designation: BPV Section VIII Division 2
Edition/Addenda: 2013
Para./Fig./Table No: Annex 2-A
Subject Description: Section VIII, Division 2; Annex 2-A - User Design Specification (UDS)
Date Issued: 01/07/2016
Record Number: 15-2001
Interpretation Number: BPV VIII-2-16-1

Question(s) and Reply(ies): Question: In accordance with paragraph 2-A.2.1(a), is it prohibited for a Manufacturer to obtain the services of a Registered Professional Engineer to certify the User's Design Specification provided that the same engineer does not certify both the User Design Specification and the Manufacturer's Design Report?

Reply: No.

PROPOSED INTERPRETATION

Inquiry No.	20-29
Source	Craig Bierl, Chubb Limited craig.bierl@chubb.com
Subject	PV Cycles of operations change as an alteration **Background:** Isostatic Presses in particular (but found in other pressure vessels also) are restricted by the data report to a finite number of cycles. Operators of these vessels routinely use curves to modify what is considered a cycle and extend the life of the vessel. These vessels represent a substantial risk of failure and this practice is very difficult for the inservice inspector to successfully track and audit to ensure the integrity of these vessels are maintained as this is a grey area in the current code as written. This is the real life scenario that has appeared on 7 of these vessels in the last 6 months (that is every one that I have been involved in evaluating for insurance coverage). 1. ASME data report says X cycles. Normally around 15-25,000. 2. Vessel is 20+ years old 3. You ask about operation and the vessel operates 330 days per year and has 5 operating cycles per day (some are 2 some are more, just throwing a number up to illustrate). So, simple math says 330x5=1650 cycles per year 25,000/1650=15.15 years of life 4. You ask for records of the operation a. You are presented with a degraded cycle curve b. "we don't operate at maximum temp (and/or) pressure" so we aren't taking a full cycle c. So now the same vessel shows that it only has 650 cycles on it or 1200 (instead of 30,000) 5. Their argument is that they are below the "design cycles", well there is no rational that the inspector can adequately track the design cycles to a degree of comfort. a. I attached one of the better design cycle tracking mechanism's I have seen, however it is still lacking Bottom line, the "operational cycle" is easily trackable. The use of curves to increase the operational cycle count beyond the ASME data report cycle maximum appears to be in conflict and lacks standardization, which makes it difficult to audit and ensure uniform measures are being taken. The cycle count appears on the data report as a criteria, if that criteria is intended to limit the operational cycle, than the use of a curve to extend that cycle should be considered an alteration and rerating of the vessel. If the cycle count on the data report is not intended to be limited by the operating cycle, then some form of standard should be created for the different types of variances that are used to extend this cycle count (by temperature, pressure, etc).
Edition	2019 NBIC, Part 3, 3.4.4 2019 NBIC, Part 2, 2.3.6.8 & 2.3.6.10
General Description	Section VIII Div.2 or Div.3 cycle life design definition

Question	Question: Should the use of a curve to extend the number of operating cycles beyond the number of cycles indicated on the ASME data report be considered an alteration/re rating of a pressure vessel (ASME Section 8 Part 3)?
Reply	Proposed Reply: Yes. The use of a curve to extend the number of operating cycles is a change in the material data on the ASME data report and is therefore an alteration of the vessel and should be considered as such through a formal re-rating process.
Committee's Question	When the design ~~definition~~ of a PRI includes cyclic loading data, should an adjustment, modification or change in analysis of ~~said~~the original design data be considered an alteration?
Committee's Reply	Yes
Rationale	For PRI's in cyclic service (thermal or mechanical) the load histograms are just as essential to the design definition as MAWP or MDMT, when those values are changed we consider that to be an alteration. In Section ~~8~~ VIII Div.2 for a class 1 vessel per paragraph 2.2.2.1 supplying the information to do fatigue analysis triggers the UDS into needed an RPE sign off. Per 2.3.3.1 conducting fatigue analysis is one of 4 events that triggers an RPE signature on the manufactures design report. Per NBIC: **Alteration** — A change in the item described on the original Manufacturer's Data Report which affects the pressure containing capability of the pressure-retaining item. (See NBIC Part 3, 3.4.3, ***Examples of Alteration***) Nonphysical changes such as an increase in the maximum allowable working pressure (internal or external), increase in design temperature, or a reduction in minimum temperature of a pressure-retaining item shall be considered an alteration.
SC Vote	
NBIC Vote	
Negative Vote Comments	

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PROPOSED INTERPRETATION

Inquiry No.	**20-49**
Source	Susumu Terada Terada.susumu@kobelco.com Kobe Steel, Ltd.
Subject	Subject: Alternative Method in lieu of Pressure Testing or Examination in Part 3, 4.4.2 c
Edition	2019
Question	Question: When contamination of pressure-retaining items by liquids is possible, pressure testing is not practicable and NDE is not effective, may finite-element analysis in accordance with Part 5 of the same edition of the original construction code, ASME Code Section VIII, Div. 2, be used to ensure the structural integrity of the alteration?
Reply	Proposed Reply: Yes. Concurrence of the owner shall be obtained in addition to the Inspector and Jurisdiction where required.
Committee's Question	When performing an alteration on a pressure ~~testing~~ retaining item and use of examination or test methods listed in Part 3, 4.4.2 are not possible, ~~can~~ may finite element~~al~~ analysis (FEA) be used in accordance with the original code of construction?
Committee's Reply	No, this ~~This~~ ~~is outside the scope of the~~method is not addressed in Part 3 of the ~~-~~NBIC.
Rationale	This inquiry was submitted regarding not being able to pressure test with liquid or perform NDE. However, the Inquirer failed to consider or eliminate pneumatic testing as a possibility in Part 3, 4.4.2~~b~~.

Item #: NB15-1405
Revision: 1
Date: January 14, 2020
Subject: Clarification of Impact Testing Rules for Repairs

Justification:
This revision was generated to address an interpretation asking whether production impact test plates were required for repair of vessels made from P-No 11B materials, when no extra material from one of the heats exist. Where extra material does not exist from one of the heats, the original code of construction would require existing material from the vessel to be used. This would require the vessel to be further damaged with material being cut out to serve as a test plate.

Initially this interpretation was meant to address only P-No 11B material; however, this same problem exists for all vessel materials. As a result, the following proposal was generated.

INSERT NEW PARAGRAPHS:

3.3.6 Pressure Vessel Impact Testing

3.3.6.1 Welding procedures used for repairs shall be qualified with impact testing when required by the original code of construction. The requirements for impact testing shall be in accordance with the rules of the original code of construction except that vessel (production) impact testing is not required.

3.3.6.2 The test material for the welding procedure qualification with impact testing shall be of the same P-number and Group number, and heat-treated condition as the material being repaired.

a) In the event that the notch toughness of the material to be repaired is unknown, evidence from tests of that material or from another acceptable source (see NBIC Part 3, 2.5.3) may be used for the base metal notch toughness when qualifying the WPS as required in NBIC Part 3, 2.5.3.2 h).

b) In the event that the original material specification is obsolete, the ~~test~~ material used for the test coupon should conform as closely as possible to the original material used for construction based on nominal composition and carbon equivalent (IIW Formula CE

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= C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15; elements are expressed in Weight Percent Amounts), and heat-treated condition, but in no case shall the material be lower in strength.

Background for Interpretation 18-100

Task Group PM – David Martinez;

Task Group members: Marty Russel and Nathan Carter

Item Number: 18-100 NBIC Location: Part 3, 3.3.2 Attachment Page 44

General Description: Revision adding (plugging) heat exchanger tubes with an outside diameter of ¾" or smaller to NBIC Part 3.3.2 Routine Repairs

Subgroup: Repairs and Alterations

Task Group: David Martinez (PM)

January 2019 Meeting Action: Progress Report: Mr. Martinez reported on this item and presented interpretations (98-04 and 98-29) that may satisfy the revision request, however after a presentation from TEiC regarding the use of explosive welding of tubes to be considered as a routine repair, Mr. Martinez recommend this be considered progress report to continue working to address explosive welding as a Routine Repair.

3.3.2 ROUTINE REPAIRS

a) Routine repairs are repairs for which the requirements for in-process involvement by the Inspector and stamping by the "R" Certificate Holder may be waived as determined appropriate by the Jurisdiction and the Inspector. All other applicable requirements of this code shall be met. Prior to performing routine repairs, the "R" Certificate Holder should determine that routine repairs are acceptable to the Jurisdiction where the pressure-retaining item is installed;

b) The Inspector, with the knowledge and understanding of jurisdictional requirements, shall be responsible for meeting jurisdictional requirements and the requirements of this code;

c) The "R" Certificate Holder's Quality System Program shall describe the process for identifying, controlling, and implementing routine repairs. Routine repairs shall be documented on Form R-1 with this statement in the Remarks section: "Routine Repair";

d) Alternative welding methods without postweld heat treatment as described in NBIC Part 3, 2.5.3 shall not be used for routine repairs.

(Example of proposed additional category to examples of Routine Repairs – paragraph e)

e) The following repairs may be considered as routine repairs and shall be limited to these categories:

1) Welded repairs or replacements of valves, fittings, tubes, or pipes NPS 5 (DN 125) in diameter and smaller, or sections thereof, where neither postweld heat treatment nor

NDE other than visual is required by the original code of construction. This includes their attachments such as clips, lugs, skirts, etc., but does not include nozzles to pressure-retaining items;

2) The addition or repair of nonload bearing attachments to pressure-retaining items where postweld heat treatment is not required;

3) Weld buildup of wasted areas in heads, shells, flanges and fittings not exceeding an area of 100 in.2 (64,520 mm2) or a thickness of 25% of nominal wall thickness or 1/2 in. (13 mm), whichever is less;

4) Corrosion resistance weld overlay not exceeding 100 in.2 (64,520 mm2); ~~and~~

5) Seal welding a mechanical connection for leak tightness where by-design, the pressure retaining capability is not dependent on the weld for strength and requires no postweld heat treatment; and

6) Plugging of heat exchanger tubes ¾ in. outside diameter and smaller when explosive plugging is used as method of plugging tubes.

Background Interpretation

INTERPRETATION 15-04

Subject: Part 3, Section 3

Edition: 2015

Question: Is explosion welding of plugs into leaking heat exchanger tubes considered a repair per the NBIC Part 3?

Reply: Yes.

Support for Consideration of the Proposed Action

ASME Section IX – 2019 (Addresses Procedure and Performance Qualification for Explosion Welding heat exchanger tubes to tubesheets, but not the plug to the tube)

QW-193 TUBE-TO-TUBESHEET TESTS
When the applicable Code Section requires the use of this paragraph for tube-to-tubesheet demonstration mockup qualification, QW-193.1 through QW-193.1.3 shall apply.

QW-193.1 Procedure Qualification Specimens. Ten mockup welds are required for qualifying each tube-to tubesheet welding procedure. The mockup assembly shall essentially duplicate the tube-to-tubesheet weld joint design to be used in production, within the limits of the essential variables of QW-288. The mockup test assembly shall be prepared with the tubesheet element having a thickness not less than the lesser of the thickness of the production tubesheet or 2 in. (50 mm). For tube-to-tubesheet welds to clad tubesheets, the cladding or overlay may be represented by a base material with a chemical composition that is essentially equivalent to the cladding composition. All welds in the mockup assembly shall be subjected to the following tests and shall meet the applicable acceptance criteria.

QW-193.1.1 Visual Examination. The accessible surfaces of the welds shall be examined visually with no magnification required. The welds shall show complete fusion, be free from visual cracks or porosity indications,
and have no evidence of burning through the tube wall.

QW-193.1.2 Liquid Penetrant. The liquid penetrant examination shall meet the requirements of Section V, Article 6. The weld surfaces shall meet the requirements of QW-195.2.

QW-193.1.3 Macro-Examination. The mockup welds shall be sectioned through the center of the tube for macro-examination. The four exposed surfaces shall be smoothed and etched with a suitable etchant (see QW-470) to give a clear definition of the weld and heat-affected zone. Using a magnification of 10X to 20X, the exposed cross sections of the weld shall confirm
(a) minimum leak path dimension required by the design
(b) no cracking
(c) complete fusion of the weld deposit into the tubesheet and tube wall face

Table QW-288.2
Essential Variables for Procedure Qualification of Tube-to-Tubesheet Welding (Explosion Welding)

Paragraph		Brief of Variables
QW-403 Base Metals	.35	ϕ Tube thickness
QW-410 Technique	.82	ϕ Pressure application
	.83	ϕ Explosive
	.84	ϕ Distance charge to tubesheet
	.85	ϕ Specified clearance

Legend:
ϕ Change

QW-410.83 A change in the type of explosive or a change in the energy content greater than ±10%.

QW-410.84 A change in the distance between the explosive charge and the tubesheet face greater than ±10%.

QW-410.85 A change in the specified clearance between the tube and the tubesheet greater than ±10%.

QW-193.2 Performance Qualification Specimens.
A minimum of five mockup tube-to-tubesheet welds are required to qualify each welder or welding operator. The same rules as those applicable for procedure qualification (QW-193.1) shall be followed, with the following additional requirements and exceptions:
(a) The essential variables in QW-387 shall apply.
(b) Essential performance qualification variables applicable for each welding process listed in QW-350 or QW-360 shall also be observed in addition to the variables of Table QW-388.
(c) Postweld heat treatment may be omitted.

Only one mockup weld is required to renew a welder's or welding operator's qualification when that qualification has expired or has been revoked per the requirements of QW-322.1.

Logic to consider motion for approval:

- Explosion welding to plug leaking tubes is supported by qualified written welding procedures and welder qualification procedures compared to other mechanical tube-plugging methods that are performed with no NBIC guidance.
- Explosion welding does not rely on fusion to join the two materials. It is a pressure weld in which the explosive force joins the two materials. Unlike fusion welding that is allowed in other examples of Routine Repairs, there is no heat affected zone, and PWHT is not needed nor required.
- The majority, if not all explosion tube plugging is performed on tubes ¾" and smaller, and typically under emergency conditions. No Inspector involvement would be required if this specific category was added to the categories of Routine Repairs
- The explosion tube-plugging method for tubes ¾" and smaller would be more cost and schedule effective and is proven to be a reliable method for plugging leaking heat exchanger tubes for owners and users.

Note: The only realistic test upon completion of explosion tube-plugging is a pressure test.

Item 19-16: NBIC Part 3, 3.2.2 e)
Submitted by: Eben Creaser eben.creaser@gnb.ca

Explanation of Need: This wording of this clause is causing confusion. I have had multiple instances where owners have requested to purchase welded replacement parts directly and read this clause with the belief that they can purchase a replacement part for in some cases a welded pressure part for an ASME Section I boiler and safe money by having the fabricator not Hydro test as per Section I even when it was not impractical to have the testing performed.

Background Information: The second sentence of 3.2.2 seems to provide optional provisions that contradict the mandatory requirement stated in the first sentence that requires 3.2.2 c) or d) parts to be pressure tested by the original code of construction. If this is the intent of the committee then the clause should be reworded to add an "or" between the sentences. The wording could also be understood to mean that all parts addressed in 3.2.2 c) or d) have to be pressure tested. But then the second sentence alludes to an optional requirement, it's just not clear.

Proposed Text:
If the intent of this clause is to provide optional pressure test requirements for parts then;

e) Replacement parts addressed by 3.2.2 c) or d) above shall receive a pressure test as required by the original code of construction prior to installation, or, when accepted by the owner, the Inspector and, where required, the Jurisdiction, parts ~~. If replacement parts have not been pressure tested as required by the original code of construction prior to installation they~~ may be installed without performing the original code of construction pressure test provided the owner, the Inspector and, when required, the Jurisdiction accept the use of one or a combination of the examination and test methods shown in Part 3, Section 4, paragraph 4.4.1 (for repairs) or 4.4.2 (for alterations). The R Certificate Holder responsible for completing the R Form shall note in the Remarks section of the R Form the examination(s) and test(s) performed, and the reason the replacement part was not tested in accordance with the original code of construction.

Fw: Rewording of Part 3 - 3.2.2 e)
Jonathan Ellis to: Terrence Hellman 07/08/2020 01:28 PM

Hi Terry,

Heard back from Eben regarding 19-16. His response is below.

Jonathan Ellis
Staff Engineer
Phone: 614-431-3236
Email: jellis@nationalboard.org

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----- Forwarded by Jonathan Ellis/NationalBoard on 07/08/2020 01:27 PM -----

From: "Eben Creaser" <eben.creaser@gmail.com>
To: jellis@nationalboard.org
Date: 07/08/2020 01:24 PM
Subject: Rewording of Part 3 - 3.2.2 e)

Jonathan,

Thanks for your diligence on this and taking the time to re-familierize me with the issue at hand. I took a lot at the wording the committee came up with and although it will address the issue raised in my opinion the wording is still a bit ambiguous. I took a run at providing some additional clarity and would appreciate you passing it along to those involved in the wording of this clause.

e) *Replacement parts addressed by 3.2.2 c) or d) above shall receive a pressure test. The test pressure applied shall be the same as that determined for the completed pressure equipment (boiler, pressure vessel, etc.) in accordance with the original code of construction. The required pressure test may be performed prior installing the replacement part or at any other time prior to placing the repaired or altered pressure retaining item back in service and signing the R Form.*

Where pressure testing of a replacement part can not be performed due to a technically justifiable reason the omission of the required pressure test shall be subject to the approval of the owner, and acceptance of the Inspector and, when

required, the Jurisdiction. The use of one or a combination of the examination and test methods shown in Part 3, Section 4, paragraph 4.4.1 (for repairs) or 4.4.2 (for alterations) shall be used in when the required pressure test has not been performed.

The R Certificate Holder responsible for completing the R Form shall note in the Remarks section of the R Form any examination(s) and test(s) performed in lieu of the required pressure test and the reason use to justify the elimination of the pressure test.

Best Regards,
Eben Creaser

Item 19-61: Request for Revision to NBIC Part 3, 3.3.2 e)

Paul Shanks
OneCIS
paul.shanks@onecis.com
832 316 4249

Purpose	Include a method in the NBIC for safely returning a PRI with damaged female thread to service
Scope:	Part: Repairs and Alterations; Section: 3.3.2 e)
Background:	Threaded insert are being used to fix a bolt that has broken off on certain types of boilers (autoclaves) which hold the heating elements in the water side of the boiler. When this happens, the technician correcting the problem will simply drill out the broken bolt with an over sized bit and inset a metallic insert. NBIC does address this this type of alteration.
Proposed Revision:	Add an example of a routine repair which is repairing a female thread per ASME PCC-2 Article 303. See below underlined text.

3.3.2 ROUTINE REPAIRS

a) Routine repairs are repairs for which the requirements for in-process involvement by the Inspector and stamping by the "R" Certificate Holder may be waived as determined appropriate by the Jurisdiction and the Inspector. All other applicable requirements of this code shall be met. Prior to performing routine repairs, the "R" Certificate Holder should determine that routine repairs are acceptable to the Jurisdiction where the pressure-retaining item is installed;
b) The Inspector, with the knowledge and understanding of jurisdictional requirements, shall be responsible for meeting jurisdictional requirements and the requirements of this code;
c) The "R" Certificate Holder's Quality System Program shall describe the process for identifying, controlling, and implementing routine repairs. Routine repairs shall be documented on Form R-1 with this statement in the Remarks section: "Routine Repair";
d) Alternative welding methods without postweld heat treatment as described in NBIC Part 3, 2.5.3 shall not be used for routine repairs.
e) The following repairs may be considered as routine repairs and shall be limited to these categories:
1) Welded repairs or replacements of valves, fittings, tubes, or pipes NPS 5 (DN 125) in diameter and smaller, or sections thereof, where neither postweld heat treatment nor NDE other than visual is required by the original code of construction. This includes their attachments such as clips,lugs, skirts, etc., but does not include nozzles to pressure-retaining items;
2) The addition or repair of nonload bearing attachments to pressure-retaining items where postweld heat treatment is not required;
3) Weld buildup of wasted areas in heads, shells, flanges and fittings not exceeding an area of 100 in.^{2} (64,520 mm^2) or a thickness of 25% of nominal wall thickness or 1/2 in. (13 mm), whichever is less;
4) Corrosion resistance weld overlay not exceeding 100 in.^{2} (64,520 mm^2); and

5) Seal welding a mechanical connection for leak tightness where by-design, the pressure retaining capability is not dependent on the weld for strength and requires no postweld heat treatment.

6) Repairing a female thread form via any method as described in 3.3.4.10

Insert new paragraph

3.3.4.10 Restoring Female Threads

When female threaded hole(s) become damaged the following methods may be used to restore those threads to an acceptable condition

a) Drilling and tapping the existing stud hole(s) to a larger size, and replacing the existing size bolt/stud with one sized accordingly- the use of this method may require custom stud(s) that have different thread sizes at each end requiring a change in diameter which shall be achieved with a minimum 3:1 taper. Material shall be the same as the other existing bolts/studs.

b) Filling the hole with weld metal using a qualified welding procedure, re-drilling, and re-tapping the hole(s) with the original thread size. The existing (damaged) thread(s) shall be removed such that weld metal is deposited on sound base material.

c) Drilling and tapping the existing hole(s) to a larger size, for the purpose of installing helical coil threaded insert. Helical coil thread inserts are generally available up to 1-1/2" Unified Coarse Series (UNC)/M36. The application and installation of helical coil threaded inserts shall be per the helical coil manufacturer's recommendations. Particular~~ly~~ attention shall be given to service conditions (internal, external), operating temperatures, materials, and loadings. ASME B18.29.1 provides additional information if required. Helical coil threaded inserts shall satisfy the design requirements of the original construction code for the loading to be applied to the threaded connection. Typically the design of the helical coil insert requires balancing the tensile strength of the bolt/stud material against the shear strength of the component base material. Materials not listed in the original construction code as required for the applicable service are not acceptable.

Comment [CN-H1]: Should this say, "Bolt/Stud material grades…."

Comment [JW2]: I agree with Nathan. Also, change this requires to requiring and add existing after other

Comment [CN-H3]: Add metric too

Comment [JW4]: Agree with Nathan

Comment [PS5]: I added M36

Comment [CN-H6]: I believe there is a B18.29m also. Consider adding it too, if it exists.

Comment [PS7]: I don't see an metric version- I don't know how much this document will add. Possibly we just drop it

Comment [CN-H8]: Not sure I understand what you are saying here. Are you saying that the treaded inserts must be from code acceptable grades of material? If so, you specify that it must meet the loadings and design requirements, but a bit concerned that someone may not understand this means must be suitable for the design pressures and temperatures. Someone could put a helical coil made from a Curve A material in a -55 degF MDMT design with little to no fracture toughness and no testing. Or what would stop someone from putting a carbon steel helical coil (cheaper) in a stainless vessel with an extremely low MDMT?

Comment [JW9]: I see Nathan's concern here, but I believe what has been modified could be an acceptable alternative.

Comment [PS10]: A few lines higher up we talk about service conditions- I will add operating temperatures here

Rational

The NBIC rules are inevitably written with a background knowledge of the ASME codes of construction, PCC-2 which is already included in NBIC Part 3 as a reference standard (Para 3.2.6 c)) is the ASME approach to repairing pressure equipment and is composed by the same people that write the rules for new construction. Given that this reference standard has already composed guidance and rules addressing the repair of damaged threads the NBIC should make use of these rules to prevent potential dangerous repairs being done by those with good intentions but with the correct knowledge of pressure equipment safety.

Reference material

ASME PCC-2 article 303 is on the cloud in full, please see below the original ASME words marked up with strike through for what I removed and underline for the words that I added. This is further complicated by the fact that I also do some reordering and brought separate paragraphs together. These below words and mark ups are provided to assist in understanding

that we have changed ASME words and are not using them verbatim. The above underlined words are intended as additions to the body of NBIC part 3

~~**303-1.2 Methods of Repair – Alternatives**~~ 3.3.4.10 **Restoring Female Threads**

~~This Article is intended to cover the repair of~~ When female threaded hole(s) become damaged ~~threads in tapped blind holes in studded connections by one of~~ the following methods~~:~~ may be used to restore those threads to an acceptable condition

(a) drilling and tapping the existing stud holes to a larger size, and replacing the existing size bolt/stud ~~fastener~~ with one sized accordingly - the use of this method may require custom stud(s) that have different thread sizes at each end this requires a change in diameter which shall be achieved with a minimum 3:1 taper. Material shall be the same as the other bolts/studs.

(b) drilling and tapping the existing ~~stud~~ holes to a larger size, for the purpose of installing helical-coil threaded inserts Helical coil thread inserts are generally available up to 1-1/2" Unified Coarse Series (UNC)/M36. The application and installation of helical coil threaded inserts shall be per the helical coil manufacturer's recommendations. Particularly attention shall be given to service conditions (internal, external), operating temperatures materials, and loadings. ASME B18.29.1 provides additional information if required. Helical coil threaded inserts shall satisfy the design requirements of the original construction code for the loading to be applied to the threaded connection. Typically the design of the helical coil insert requires balancing the tensile strength of the bolt/stud material against the shear strength of the component base material. Materials not listed in the original construction code are not acceptable.

(c) filling the existing stud holes with weld metal using a suitably qualified welding procedure, redrilling, and retapping the holes with the original thread size. The existing (damaged) thread(s) shall be removed such that weld metal is deposited on sound base material.

303-2.6 Helical Coil Thread Inserts

Helical coil thread inserts are generally available up to 11/2 Unified Coarse Series (UNC)/M36. The application and installation of helical-coil threaded inserts shall be per the manufacturer's recommendations, particularly ~~with respect~~ attention shall be given to service conditions (internal, external), operating temperatures materials, and loadings. ASME 818.29.1 provides additional information if required.

~~**303-3.3.3 Tapered Studs.** In some applications, it may be possible to replace the existing studs with a~~ custom ~~"tapered"~~ stud ~~(see Figure 303-3.3.3-1 for an example), where one end of the stud retains its original diameter while the other end is enlarged. This maintains the design bolt loads consistent with the original design, avoids the need to drill larger holes in the mating flange/ cover, and permits the possible reuse of the nuts.~~

303-3.5 Design of Helical Coil Thread Inserts

Helical-coil threaded inserts shall satisfy the design requirements of the original construction code ~~or applicable post-construction code for the specified~~ loading to be applied to the threaded connection. ~~In general~~, the design ~~is based on~~ balancing the tensile strength of the stud material against the shear strength of the component base material. ~~For~~ materials not listed in the original construction code as required for the applicable service are not acceptable ~~or applicable post-construction code, primary stresses should not exceed the lesser of % of the minimum specified yield strength or %.s of the minimum specified tensile strength of the applicable material~~.

~~**303-4.2 Hole Preparation Before Welding**~~

~~If the damaged threads are repaired by filling the existing stud holes with weld metal, the holes shall be free of debris and~~ the existing threads removed ~~(usually done by drilling out) to ensure that the new~~ weld deposit ~~does not include this~~ material.

303-4.6 Installation of Helical Coil Thread Inserts

~~When~~ helical-coil threaded inserts are used, they shall be installed in accordance with the manufacturer's ~~instructions.~~

Comment [PS11]: This is an addition to 303 1.2 (a) and is paraphrased from 303-3.3.3 below the only direct cross over is "custom stud" but I removed the ""tapered"" from the ASME use

Comment [PS12]: This addition is paraphrased from 303-2.6, 303-3.5 and 303-4.6 below. 303-2.6 is mostly used as is with some re-wording and inclusion of the installation per manufactures recommendation as mentioned in 303-4.6. 303-3.5 has more modification to drop references to codes other than the original code of construction I also completely removed the option to use none-code material.

Comment [PS13]: I corrected the spelling with hyphens per Words advice

Comment [PS14]: I reversed B and C

Comment [PS15]: This is paraphrased from 303 4.2 below most of ASME words are removed but the concept stays the same- get rid of the threads give the weld a chance to be successful.

Article 303
Damaged Threads in Tapped Holes

303-1 DESCRIPTION

303-1.1 Introduction

The design requirements of equipment such as vessels, machinery, valves, instruments, etc., where close coupling is required because of operational, economic, or space considerations, often dictate the use of tapped holes; usually with a stud, but sometimes with a cap screw. When a stud is used, the stud is engaged within a drilled and tapped hole at one end and secured with a nut at the other end. The threads in the tapped hole often have a tighter fit with the stud than do the threads in the nut. The tighter fit usually is specified, and the stud is usually bottomed in the tapped hole, to facilitate removing the nut from the stud without removing the stud from the tapped hole. Threads in tapped holes often are damaged when studs are removed after a period of service.

303-1.2 Methods of Repair — Alternatives

This Article is intended to cover the repair of damaged threads in tapped blind holes in studded connections by one of the following methods:

(a) drilling and tapping the existing stud holes to a larger size, and replacing the existing size fastener with one sized accordingly

(b) drilling and tapping the existing stud holes to a larger size, for the purpose of installing helical-coil threaded inserts

(c) filling the existing stud holes with weld metal, redrilling, and retapping the holes

303-1.3 Repair Methods Not Covered

Other methods that may be considered for repair of damaged threads, but are not covered in this Article, include the following:

(a) retapping the existing stud holes with the same size tap (also referred to as "chasing" the threads)

(b) replacement of the component containing the tapped holes

NOTE: Most of the guidelines in this Article are intended for repair of damaged threads in tapped blind holes, as would be found in studded connections. While this Article does not specifically exclude applications such as holes that extend completely through the pressure component, the user is cautioned that many of the requirements herein may not be applicable or sufficient to cover those cases.

303-2 LIMITATIONS

303-2.1 Additional Requirements

Part 1 of this Standard contains additional requirements and limitations. This Article shall be used in conjunction with Part 1.

303-2.2 Retapping Existing Holes

Unless visual examination of the threads in the stud hole indicates substantial damage to the threads, it is sometimes advantageous to attempt to retap the holes using the same size tap, a process known as "chasing" the threads. Sometimes the only problem is that corrosion products and/or residue from the process plugged the threads.

303-2.3 Design Adequacy of Enlarging Stud Holes

Enlargement of existing stud holes shall not be done until an engineering analysis confirms the design adequacy of the proposed assembly (see section 303-3).

303-2.4 Repair of Cracks

If an examination of the stud holes reveals cracks at the face of the hole opening (see section 303-5), those cracks shall be repaired prior to enlargement of existing stud holes, if the enlarged hole size is not sufficient to remove the cracks.

303-2.5 Welding and Material Considerations

If repairs involve welding, with or without postweld heat treatment, the potential exists for warpage of the assembly and possible leakage. For some materials (such as low alloy steels), subsequent postweld heat treatment operations may adversely affect the material toughness. Also, consideration shall be given to the potential for cracking of materials that may have experienced temper embrittlement. In these situations, either a welding or materials specialist, or both, should be consulted prior to commencing repairs.

303-2.6 Helical Coil Thread Inserts

Helical coil thread inserts are generally available up to $1\frac{1}{2}$ Unified Coarse Series (UNC). The application of helical-coil threaded inserts shall be per the manufacturer's recommendations, particularly with respect to service conditions (internal, external), materials, and loadings. ASME B18.29.1 provides additional information.

303-3 DESIGN

303-3.1 Applicable Codes

Upon completion of the repair, the design of the bolted assembly shall be in accordance with the original construction code or applicable post-construction code.

303-3.2 Thread Modification

A standard taper tap will produce incomplete tapped threads near the bottom of the tapped hole; even the use of a bottoming tap will not ensure a complete final thread. As a consequence, bottoming a fully threaded stud into a tapped hole that has incomplete threads near the bottom damages the full threads on the end of the stud. This almost ensures that the full threads in the tapped hole will be damaged as the stud with damaged threads is backed out. A practice that has been used successfully to prevent this from occurring is to remove some of the threads from the studs and to increase the depth of the tapped holes accordingly. A sketch with suggested dimensions is provided in Mandatory Appendix 303-I.

303-3.3 Enlargement of Existing Holes

The design considerations specified in paras. 303-3.3.1 through 303-3.3.3 are applicable to repair of damaged threads by enlarging the tapped hole diameter.

303-3.3.1 Check of Thread Engagement. Before enlarging the tapped hole diameter, the length of thread engagement shall be rechecked to ensure compliance with the requirements of the original construction code [e.g., ASME BPVC, Section VIII, Division 1, UG-43 (g); ASME BPVC, Section VIII, Division 2, AD-740; or ASME BPVC, Section VIII, Division 3, KD-615(b)] or applicable post-construction code.

NOTE: If the parts under consideration are not governed by the rules of the ASME Code, another applicable construction code or post-construction code, the design may refer to ASME B1.1 (Nonmandatory Appendix B, Thread Strength Design Formulas).

303-3.3.2 Check of Flange Stresses. If the fastener diameter is increased, the flange stresses (including the untapped mating flange/cover) shall be rechecked to see if they remain within acceptable levels, given the potential for increased loads generated by the larger fastener diameter. This should include consideration of increased bolt preload due to the larger fasteners on flange stresses due to bolt up.

303-3.3.3 Tapered Studs. In some applications, it may be possible to replace the existing studs with a custom "tapered" stud (see Figure 303-3.3.3-1 for an example), where one end of the stud retains its original diameter while the other end is enlarged. This maintains the design bolt loads consistent with the original design, avoids the need to drill larger holes in the mating flange/cover, and permits the possible reuse of the nuts.

303-3.4 Hole Enlargement Implications on Design

When the existing tapped hole is drilled to a larger diameter, material is removed from the component containing the hole. The design shall consider the implications associated with this repair method to ensure that the remaining material provides sufficient strength to satisfy the intended design conditions. Mandatory Appendix 303-II offers an example of a check made to a studded outlet connection in a pressure vessel.

303-3.5 Design of Helical Coil Thread Inserts

Helical-coil threaded inserts shall satisfy the design requirements of the original construction code or applicable post-construction code for the specified loading to be applied to the threaded connection. In general, the design is based on balancing the tensile strength of the stud material against the shear strength of the component base material. For materials not listed in the original construction code or applicable post-construction code, primary stresses should not exceed the lesser of $\frac{2}{3}$ of the minimum specified yield strength or $\frac{1}{3.5}$ of the minimum specified tensile strength of the applicable material.

303-4 FABRICATION

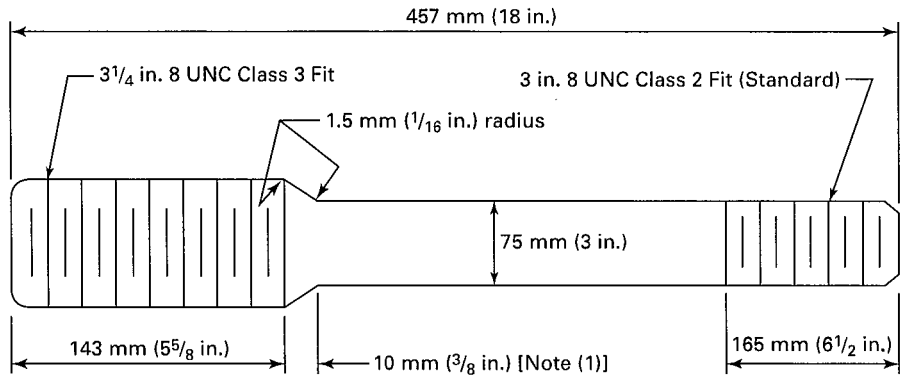
303-4.1 Hole Depth of Penetration

Drilled holes to be tapped shall not exceed the maximum depth of penetration through the thickness of the pressure component, as defined by the original construction code [e.g., ASME BPVC, Section VIII, Division 1, UG-43(d) or ASME BPVC, Section VIII, Division 2, AD-630], or applicable post-construction code.

303-4.2 Hole Preparation Before Welding

If the damaged threads are repaired by filling the existing stud holes with weld metal, the holes shall be free of debris and the existing threads removed (usually done by drilling out) to ensure that the new weld deposit does not include this material.

Figure 303-3.3.3-1 Example of Tapered Stud



NOTE: (1) For other sizes, as needed to attain a 3:1 taper.

303-4.3 Welding Procedures and Qualifications

Welding procedures, welders, or welding operators, where used, shall be qualified in accordance with the original construction code or applicable post-construction code.

303-4.4 Welding and Material Considerations

Any special welding requirements, including preheat or postweld heat treatment, shall be in accordance with the original construction code or applicable post-construction code. Because of the potential for warpage of the component, a welding/materials specialist should be consulted regarding procedures/processes, preheat, and postweld heat treatment.

303-4.5 Flange Refinishing

If the gasket contact surface has been warped as a result of weld repairs or heat treatment, it may require refinishing (see Article 305).

303-4.6 Installation of Helical Coil Thread Inserts

When helical-coil threaded inserts are used, they shall be installed in accordance with the manufacturer's instructions.

303-4.7 Thread Galling and Lubrication

Special attention should be given to prevent thread galling after assembly. In addition, lubricant should be applied to the bolt thread surface in accordance with ASME PCC-1, section 7.

303-5 EXAMINATION

303-5.1 Visual Examination

Drilled holes shall be visually examined for workmanship, cleanliness, and evidence of cracking.

303-5.2 Need for Additional NDE

Where material deterioration or damage is suspected, additional nondestructive examination shall be considered.

303-5.3 Examination Procedures

Examination procedures shall be in accordance with the original construction code or applicable post-construction code.

303-6 TESTING

Testing requirements associated with modification of the flange assembly shall be in accordance with the applicable post-construction code.

303-7 REFERENCES (18)

The following is a list of publications referenced in this Article.

ASME B1.1-2003, Unified Inch Screw Threads (UN and UNR Thread Form)

ASME B18.29.1-1993, Helical Coil Screw Thread Inserts — Free Running and Screw Locking (Inch Series), including Errata issued August 1995

ASME Boiler and Pressure Vessel Code, 2007 Edition: Section VIII, Division 1 — Rules for Construction of Pressure Vessels; Section VIII, Division 2 — Alternative Rules; Section VIII, Division 3 — Alternative Rules for Construction of High Pressure Vessels

ASME PCC-1-2000, Guidelines for Pressure Boundary Bolted Flange Joint Assembly

Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016-5990 (www.asme.org)

Item 19-82: Request for Revision to NBIC Part 3, 1.5.1 j)

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Purpose	Safety is not addressed in Part 3. This verbiage could be added to the 1.5.1 j) Method of Performing Work paragraph so Certificate Holders can address the safety concerns specific to their scope of activities.
Scope:	Part: Repairs and Alterations; Section: 1.5.1; Paragraph: 1.5.1 j)
Background:	Safety concerns from confined space issues, to flammable or volatile vessel contents should be addressed in Part 3 to ensure that welders, Inspectors, and other personnel are not put at unnecessary risk during Repair/Alteration activity.
Proposed Revision:	See below for the proposed revision

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

h) Repair and Alteration Methods

The manual shall include controls for repairs and alterations, including mechanical assembly procedures, materials, nondestructive examination methods, pre-heat, and postweld heat treatment, as applicable. Special requirements such as nonmetallic repairs and alterations to graphite and fiber- reinforced thermosetting plastic pressure-retaining items including bonding or mechanical assembly procedures shall be addressed, if applicable.

i) Materials

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

j) Method of Performing Work

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

k) Welding, NDE and Heat Treatment

The manual shall describe controls for welding, nondestructive examination (NDE), and heat treatment. The manual is to indicate the title of the individual(s) responsible for the welding procedure specification (WPS) and its qualification, and the qualification of welders and welding

2.3 STANDARD WELDING PROCEDURE SPECIFICATIONS (SWPSs)

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

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

1) Reaffirmed SWPSs: When reaffirmation occurs without revision to the SWPS, the letter R is added to the SWPS designation.

2) Amended SWPSs: When an amendment occurs the suffix “AMD1” is added to the SWPS designation. Amendments are issued when essential for the prompt correction of an error that could be misleading. Amendments are incorporated into the existing text of the SWPS, which is reprinted and clearly marked as incorporating an amendment(s), and which is identified in the revised Foreword of the amended SWPS.

3) Revised SWPSs: When a revision to a published SWPS occurs, the publication date is added to the SWPS designation. The date of the superseded SWPS is also noted on the cover page. Previous versions of the superseded SWPS may be used at the option of the R Certificate holder.

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

CARBON STEEL- (P1/M1 MATERIAL)

SMAW — Shielded Metal Arc Welding	
TITLE	**DESIGNATION: YEAR**
Standard Welding Procedure Specification for Shielded Metal Arc Welding of Carbon Steel, (M-1/P-1, Group 1 or 2), 3/16 in. (5 mm) through 3/4 in. (19 mm) Thick, As-Welded Condition, With Backing, Primarily Plate and Structural Applications.	B2.1-1-001: ~~2018~~2020
Standard Welding Procedure Specification for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1~~/S-1~~, Group 1 or 2), 1/8 in. (3 mm) through 1 ½ in. (38 mm) Thick, E7018, As-Welded or PWHT Condition, Primarily Plate and Structural Applications.	B2.1-1-016: 2018
Standard Welding Procedure Specification for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1~~/S-1~~, Group 1 or 2), 1/8 in. (3 mm) through 1 ½ in. (38 mm) Thick, E6010, As-Welded or PWHT Condition, Primarily Plate and Structural Applications.	B2.1-1-017: 2018
Standard Welding Procedure Specification for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1~~/S-1~~, Group 1 or 2), 1/8 in. (3 mm) through 1 ½ in. (38 mm) Thick, E6010 (Vertical Uphill) followed by E7018, As-Welded or PWHT Condition, Primarily Plate and Structural Applications.	B2.1-1-022: 2018
Standard Welding Procedure Specification for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1~~/S-1~~, Group 1 or 2), 1/8 in. (3 mm) through 1 ½ in. (38 mm) Thick, E6010 (Vertical Downhill) followed by E7018, As-Welded or PWHT Condition, Primarily Plate and Structural Applications.	B2.1-1-026: 2018
Standard Welding Procedure Specification for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8 in. (3mm) through 3/4 in. (19 mm) Thick, E6010 (Vertical Uphill) followed by E7018, (Vertical Uphill) in the As-Welded Condition, Primarily Pipe Applications.	B2.1-1-201: 2019
Standard Welding Procedure Specification for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8 in. (3 mm) through 3/4 in. (19 mm) Thick, E6010 (Vertical Downhill) followed by E7018 (Vertical Uphill), in the As-Welded Condition, Primarily Pipe Applications.	B2.1-1-202: 2019
Standard Welding Procedure Specification for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8 in. (3 mm) through 3/4 in. (19 mm) Thick, E6010 (Vertical Uphill), In the As-Welded Condition, Primarily Pipe Applications.	B2.1-1-203: 2019
Standard Welding Procedure Specification for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8 in. (3 mm) through 3/4 in. (19 mm)Thick, E6010 (Vertical Downhill Root with balance Vertical Uphill), in the As-Welded Condition, Primarily Pipe Applications.	B2.1-1-204: 2019
Standard Welding Procedure Specification for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8 in. (3 mm) through 1 ½ in. (38 mm) Thick, E6010 (Vertical Uphill) followed by E7018 (Vertical Uphill), in the As-Welded or PWHT Condition, Primarily Pipe Applications.	B2.1-1-205:2019
Standard Welding Procedure Specification for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8 in. (3 mm) through 1-1/2 in. (38 mm) Thick, E6010 Vertical Downhill) followed by E7018 (Vertical Uphill), in the As-Welded or PWHT Condition, Primarily Pipe Applications.	B2.1-1-206:2019
Standard Welding Procedure Specification for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8 in. (3 mm) through 1 ½ in. (38 mm) Thick, E7018, in the As-Welded or PWHT Condition, Primarily Pipe Applications.	B2.1-1-208: 2019

GTAW — Gas Tungsten Arc Welding	
TITLE	**DESIGNATION: YEAR**
Standard Welding Procedure Specification for Gas Tungsten Arc Welding of Carbon Steel, (M-1/P-1, Group 1 or 2), 3/16 in. (5 mm) through 7/8 in. (22 mm) Thick, ER70S-2 and ER70S-3, in the As-Welded Condition~~, With or Without Backing,~~ Primarily Plate and Structural Applications.	B2.1-1-002: ~~2006~~2020
Standard Welding Procedure Specification for Gas Tungsten Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8 in. (3 mm) through 1 ½in. (38 mm) Thick, ER70S-2, As-Welded or PWHT Condition, Primarily Pipe Application.	B2.1-1-207: 2019
Standard Welding Procedure Specification for Gas Tungsten Arc Welding with Consumable Insert Root of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 in. through 1-1/2 in. Thick, INMs-1, ER70S-2, As-Welded or PWHT Condition, Primarily Pipe Applications.	B2.1-1-210: 2012

FCAW — Flux Core Arc Welding	
TITLE	**DESIGNATION: YEAR**
Standard Welding Procedure Specification for Self-Shielded Flux Cored Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 in. through 1 ½ in. Thick, E71T-8, As-Welded Condition, Primarily Plate and Structural Applications.	B2.1-1-018: 2005
Standard Welding Procedure Specification for CO2 Shielded Flux Cored Arc Welding of Carbon Steel (M-1/P-1~~/S-1~~, Group 1 or 2), 1/8 in. (3 mm) through 1 ½ in. (38 mm) Thick, E70T-1 and E71T-1, As-Welded Condition, Primarily Plate and Structural Applications.	B2.1-1-019: 2018
Standard Welding Procedure Specification for 75% Ar/25% CO2 Shielded Flux Cored Arc Welding of Carbon Steel (M-1/P-1~~/S-1~~, Group 1 or 2), 1/8 in. (3 mm) through 1-1/2 in. (38 mm) Thick, E70T-1M and E71T-1M, As-Welded or PWHT Condition, Primarily Plate and Structural Applications.	B2.1-1-020: 2018
Standard Welding Procedure for Self-Shielded Flux Cored Arc Welding of Carbon Steel (M-1/P-1 Group 1 or 2), 1/8 in. (3 mm) through 1/2 in. (13 mm) Thick, E71T-11, As-Welded Condition, Primarily Plate and Structural Applications.	B2.1-1-027: 2018
Standard Welding Procedure Specification (SWPS) for Argon Plus 25% Carbon Dioxide Shielded Flux Cored Arc Welding of Carbon Steel (M-1/P-1/S-1, Groups 1 and 2), 1/8 in. through 1 ½ in. Thick, E7XT-XM, As-Welded or PWHT Condition, Primarily Pipe Applications.	B2.1-1-234: 2006

GMAW – Gas Metal Arc Welding	
TITLE	**DESIGNATION: YEAR**
Standard Welding Procedure Specification for 75% Argon Plus 25% Carbon Dioxide Shielded Gas Metal Arc Welding (Short Circuiting Transfer Mode) followed by Argon Plus 2% Oxygen Shielded Gas Metal Arc Welding (Spray Transfer Mode) of Carbon Steel (M-1/P-1~~/S-1~~, Groups 1 and 2), 1/8 in. (3 mm) through 1 ½ in. (38 mm) Thick, ER70S-3, in the As-Welded or PWHT Condition, Primarily Pipe Applications.	B2.1-1-233: ~~2006~~2020
Standard Welding Procedure Specification for Argon Plus 2% Oxygen Shielded Gas Metal Arc Welding (Spray Transfer Mode) of Carbon Steel (M-1/P-1/S-1, Groups 1 and 2), 1/8 in. through 1 ½ in. Thick, ER70S-3, Flat Position Only, As-Welded or PWHT Condition, Primarily Pipe Applications.	B2.1-1-235: 2006

GTAW/SMAW Combination of Welding Processes	
TITLE	**DESIGNATION: YEAR**
Standard Welding Procedure Specification for Gas Tungsten Arc Welding Followed by Shielded Metal Arc Welding of Carbon Steel (M-1/P-1~~/S-1~~, Group 1 or 2), 1/8 in. (3 mm) through 1 ½ in. (38 mm) Thick, ER70S-2 and E7018, As-Welded or PWHT Condition, Primarily Plate and Structural Applications.	B2.1-1-021: 2018
Standard Welding Procedure Specification for Gas Tungsten Arc Welding followed by Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Groups 1 or 2), 1/8 in. (3 mm) through 1 ½ in. (38 mm) Thick, ER70S-2 and E7018, As-Welded or PWHT Condition, Primarily Pipe Applications.	B2.1-1-209: 2019
Standard Welding Procedure Specification for Gas Tungsten Arc Welding with Consumable Insert Root Followed by Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 in. through 1 ½ in. Thick, INMs-1, ER70S-2, and E7018 As-Welded or PWHT Condition, Primarily Pipe Applications.	B2.1-1-211: 2012

GMAW/FCAW – Combination of Welding Processes	
TITLE	**DESIGNATION: YEAR**
Standard Welding Procedure Specification for 75% Argon Plus 25% Carbon Dioxide Shielded Gas Metal Arc Welding (Short Circuiting Transfer Mode) Followed by 75% Argon Plus 25% Carbon Dioxide Shielded Flux Cored Arc Welding of Carbon Steel (~~m~~M-1/P-1~~/S-1~~, Groups 1 ~~and~~ or 2), 1/8 in. (3 mm) through 1 ½ in. (38 mm) Thick, ER70S-3 and E71~~X~~T-X, in the As-Welded or PWHT Condition, Primarily Pipe	B2.1-1-232: ~~2006~~2020

Austenitic Stainless Steel — (M8/P8 Materials)

SMAW — Shielded Metal Arc Welding	
TITLE	**DESIGNATION: YEAR**
Standard Welding Procedure Specification for Shielded Metal Arc Welding of Austenitic Stainless Steel (M-8/P-8~~/S-8~~, Group 1), 1/8 in. (3 mm) through 1½ in. (38 mm) Thick, As-Welded Condition, Primarily Plate and Structural Applications.	B2.1-8-023: 2018
Standard Welding Procedure Specification for Shielded Metal Arc Welding of Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 in through 1½ in. Thick, E3XX-XX, As-Welded Condition, Primarily Pipe Application.	B2.1-8-213: 2012

GTAW — Gas Tungsten Arc Welding	
TITLE	**DESIGNATION: YEAR**
Standard Welding Procedure Specification for Gas Tungsten Arc Welding of Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/16 in. through 1 ½ in. Thick, ER3XX, As-Welded Condition, Primarily Plate and Structural Applications.	B2.1-8-024: 2012
Standard Welding Procedure Specification for Gas Tungsten Arc Welding of Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/16 in. through 1 ½ in. thick, ER3XX, As-Welded Condition, Primarily Pipe Applications.	B2.1-8-212: 2012

Standard Welding Procedure Specification for Gas Tungsten Arc Welding With Consumable Insert Root of Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 in. through 1 ½ in. Thick, IN3XX and ER3XX As-Welded Condition, Primarily Pipe Applications.	B2.1-8-215: 2012

Combination Processes GTAW/SMAW	
TITLE	**DESIGNATION: YEAR**
Standard Welding Procedure Specification for Gas Tungsten Arc Welding followed by Shielded Metal Arc Welding of Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 in. through 1 ½ in. Thick, ER3XX and E3XX-XX, As-Welded Condition, Primarily Plate and Structural Applications.	B2.1-8-025: 2012
Standard Welding Procedure Specification for Gas Tungsten Arc Welding Followed by Shielded Metal Arc Welding of Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 in. through 1 ½ in. Thick, ER3XX and E3XX-XX, As-Welded Condition, Primarily Pipe Applications.	B2.1-8-214: 2012
Standard Welding Procedure Specification for Gas Tungsten Arc Welding with Consumable Insert Root followed by Shielded Metal Arc Welding of Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 in. through 1 ½ in. Thick, IN3XX, ER3XX, and E3XX-XX As-Welded Condition, Primarily Pipe Applications.	B2.1-8-216: 2012

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

SMAW — Shielded Metal Arc Welding	
TITLE	**DESIGNATION: YEAR**
Standard Welding Procedure Specifications for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Groups 1 or 2) to Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 in. through 1 ½ in. Thick, E309 (L)-15, -16, or -17, As-Welded Condition, Primarily Pipe Applications.	B2.1-1/8-228: 2013

GTAW — Gas Tungsten Arc Welding	
TITLE	**DESIGNATION: YEAR**
Standard Welding Procedure Specification for Gas Tungsten Arc Welding of Carbon Steel (M-1/P-1/S-1, Groups 1 or 2) to Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/16 in. (1.6 mm) through 1 ½ in. Thick, ER309(L), As-Welded Condition, Primarily Pipe Applications.	B2.1-1/8-227: 2013
Standard Welding Procedure Specifications for Gas Tungsten Arc Welding with Consumable Insert Root of Carbon Steel (M-1/P-1/S-1, Groups 1 or 2) to Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/16 in. (1.6 mm) through 1½ in. Thick, IN309 and ER309(L), As-Welded Condition, Primarily Pipe Applications.	B2.1-1/8-230: 2013

GTAW/SMAW Combination of Welding Processes	
TITLE	**DESIGNATION: YEAR**
Standard Welding Procedure Specifications for Gas Tungsten Arc Welding followed by Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1,Groups 1 or 2) to Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 in through 1½ in. Thick, ER309 (L) and E309 (L)-15, -16, or -17, As-Welded Condition, Primarily Pipe Applications.	B2.1-1/8-229: 2013
Standard Welding Procedure Specifications for Gas Tungsten Arc Welding with Consumable Insert Root followed by Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Groups 1 or 2) to Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 In. through 1½ in. Thick, IN3009, ER309, and E309-15, -16, or -17 or IN309, ER309 (L) and ER309 (L)-15, -16, or -17, As-Welded Condition, Primarily Pipe Applications.	B2.1-1/8-231: 2015

Chromium Molybdenum Steel (M4/P4 and M5A/P5A Materials)

SMAW — Shielded Metal Arc Welding	
TITLE	**DESIGNATION: YEAR**
Standard Welding Procedure Specifications for Shielded Metal Arc Welding of Chromium-Molybdenum Steel (M-4/P-4, Group 1 or 2), E8018-B2, 1/8 in. through 1 ½ in. Thick, As-Welded Condition, 1/8 in. through 1½ in. Thick, PWHT Condition, Primarily Pipe Applications.	B2.1-4-218: 2009
Standard Welding Procedure Specifications for Shielded Metal Arc Welding of Chromium-Molybdenum Steel (M-5A/P-5A), E9018-B3, 1/8 in. through 1 ½ in. Thick, As-Welded Condition, 1/8 in. through 1½ in. Thick, PWHT Condition, Primarily Pipe Applications.	B2.1-5A-223: 2009

GTAW — Gas Tungsten Arc Welding	
TITLE	**DESIGNATION: YEAR**
Standard Welding Procedure Specifications for Gas Tungsten Arc Welding of Chromium-Molybdenum Steel (M-4/P-4, Group 1 or 2), ER80S-B2, 1/8 in. through 1 ½ in. Thick, As-Welded Condition, 1/8 in. through ¾ in. Thick, PWHT Condition, Primarily Pipe Applications.	B2.1-4-217: 2009
Standard Welding Procedure Specifications for Gas Tungsten Arc Welding (Consumable Insert Root) of Chromium-Molybdenum Steel (M-4/P-4, Group 1 or 2), E8018-B2, 1/8 in. through 1 ½ in. Thick, As-Welded Condition, 1/8 in. through ¾ in. Thick, PWHT Condition, IN515 and ER80S-B2, Primarily Pipe Applications.	B2.1-4-220: 2009
Standard Welding Procedure Specifications for Gas Tungsten Arc Welding of Chromium-Molybdenum Steel (M-5A/P-5A), ER90S-B3, 1/8 in. through 1½ in. Thick, As-Welded Condition, 1/8 in. through 3/4 in. (19 mm) Thick, PWHT Condition, Primarily Pipe Applications.	B2.1-5A-222: 2009

Standard Welding Procedure Specifications for Gas Tungsten Arc Welding (Consumable Insert Root) of Chromium-Molybdenum Steel (M-5A/P-5A), 1/8 in. through 1-1/2 in. Thick, As-Welded Condition, 1/8 in. through 3/4 in. Thick, PWHT Condition, IN521 and ER90S-B3, Primarily Pipe Applications.	B2.1-5A-225: 2009

GTAW/SMAW Combination of Welding Processes	
TITLE	**DESIGNATION: YEAR**
Standard Welding Procedure Specifications for Gas Tungsten Arc Welding (Consumable Insert Root) followed by Shielded Metal Arc Welding of Chromium- Molybdenum Steel (M-4/P-4, Group 1 or 2), 1/8 in. through 1-1/2 in. Thick, As-Welded Condition, 1/8 in. through 1 ½ in. Thick, PWHT Condition, IN515, ER80S-B2, and E8018-B2, Primarily Pipe Applications.	B2.1-4-221: 2009
Standard Welding Procedure Specifications (SWPS) for Gas Tungsten Arc Welded followed by Shielded Metal Arc Welding of Chromium-Molybdenum Steel (M-4A/P-4, Group 1 or 2), 1/8 in. through 1/2 in. Thick, As-Welded Condition, 1/8 in. through 1 ½ in. Thick, PWHT Condition, ER80S-B2 and E8018-B2, Primarily Pipe Applications.	B2.1-4-219: 2009
Standard Welding Procedure Specifications for Gas Tungsten Arc Welded followed by Shielded Metal Arc Welding of Chromium-Molybdenum Steel (M-5A/P-5A), 1/8 in. through 1 ½ in. Thick, As-Welded Condition, 1/8 in. through 1 ½ in. Thick, PWHT Condition, ER90S-B3 and E9018-B3, Primarily Pipe Applications	B2.1-5A-224: 2009
Standard Welding Procedure Specifications for Gas Tungsten Arc Welding (Consumable Insert Root) followed by Shielded Metal Arc Welding of Chromium-Molybdenum Steel (M-5A/P-5A), 1/8 in. through 1 ½ in. Thick, As- Welded Condition, 1/8 in. through 1 ½ in. Thick, PWHT Condition, IN521, ER90S-B3, and E9018-B3, Primarily Pipe Applications.	B2.1-5A-226: 2009

Item 20-6: Update adding the 2020 revision of the designated SWPSs.
July 13, 2020

AWS B2.1-1-001:2020
An American National Standard

Approved by the
American National Standards Institute
July 31, 2019

Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 3/16 inch [5 mm] through 3/4 inch [19 mm] Thick, E7016 and E7018, in the As-Welded Condition, Primarily Plate and Structural Applications

3rd Edition

Revises AWS B2.1-1-001-90 (R2006)

Prepared by the
American Welding Society (AWS) B2 Committee on Procedure and Performance Qualification

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This standard contains the essential welding variables for carbon steel plate and pipe in the thickness range of 3/16 inch [5 mm] through 3/4 inch [19 mm], using manual shielded metal arc welding. It cites the base metals and operating conditions necessary to make the weldment, the filler metal specifications, and the allowable joint designs for fillet and groove welds. This SWPS was developed primarily for plate and structural applications.

American Welding Society®

Foreword

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The need for pretested welding procedures that are supported by adequate test data and that satisfy the technical requirements for the commonly used construction codes and specifications has been expressed by many individuals and organizations. The purpose of a welding procedure qualification is to provide test data for assessing the properties of a weld joint.

This Standard Welding Procedure Specification is an outgrowth of the coordinated work of the AWS B2G Subcommittee on Procedure Qualification Records and the AWS B2 Committee on Procedure and Performance Qualification. The AWS B2G Subcommittee on Procedure Qualification Records has provided the data documented on the Summary of Procedure Qualification Records.

The welding terms used in this specification shall be interpreted in accordance with the definitions given in the latest edition of AWS A3.0M/A3.0, *Standard Welding Terms and Definitions, Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying.* Welding symbols shall be those shown in the latest edition of AWS A2.4, *Standard Symbols for Welding, Brazing, and Nondestructive Examination.*

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A vertical line in the margin or underlined text in clauses, tables, or figures indicates an editorial or technical change from the previous edition.

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AWS B2.1-1-002:2020
An American National Standard

Approved by the
American National Standards Institute
March 16, 2020

Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 3/16 inch [5 mm] through 7/8 inch [22 mm] Thick, ER70S-2 and ER70S-3, in the As-Welded Condition, Primarily Plate and Structural Applications

3rd Edition

Revises AWS B2.1-1-002-90 (R2006)

Prepared by the
American Welding Society (AWS) B2 Committee on Procedure and Performance Qualification

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This standard contains the essential welding variables for carbon steel plate and pipe in the thickness range of 3/16 inch [5 mm] through 7/8 inch [22 mm], using manual gas tungsten arc welding. It cites the base metals and operating conditions necessary to make the weldment, the filler metal specifications, and the allowable joint designs for fillet and groove welds. This SWPS was developed primarily for plate and structural applications.

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The welding terms used in this specification shall be interpreted in accordance with the definitions given in the latest edition of AWS A3.0M/A3.0, *Standard Welding Terms and Definitions, Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying*. Welding symbols shall be those shown in the latest edition of AWS A2.4, *Standard Symbols for Welding, Brazing, and Nondestructive Examination*. The AWS designations for welding gases should be those shown in the latest edition of AWS A5.32M/A5.32 (ISO 14175 MOD), *Welding Consumables—Gases and Gas Mixtures for Fusion Welding and Allied Processes.*

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AWS B2.1-1-232:2020
An American National Standard

Approved by the
American National Standards Institute
July 31, 2019

Standard Welding Procedure Specification (SWPS) for 75% Argon Plus 25% Carbon Dioxide Shielded Gas Metal Arc Welding (Short Circuiting Transfer Mode) followed by 75% Argon Plus 25% Carbon Dioxide Shielded Flux Cored Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8 inch [3 mm] through 1-1/2 inch [38 mm] Thick, ER70S-3 and E71T-X, in the As-Welded or PWHT Condition, Primarily Pipe Applications

2nd Edition

Revises AWS B2.1-1-232:2006

Prepared by the
American Welding Society (AWS) B2 Committee on Procedure and Performance Qualification

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This standard contains the essential welding variables for carbon steel in the thickness range of 1/8 inch [3 mm] through 1-1/2 inch [38 mm], using gas metal arc welding (short circuiting transfer mode) with 75% argon plus 25% carbon dioxide shielding for the root followed by flux cored arc welding with 75% argon plus 25% carbon dioxide shielding for the balance. It cites the base metals and operating conditions necessary to make the weldment, the filler metal specifications, and the allowable joint designs for groove welds. This SWPS was developed primarily for pipe application.

American Welding Society®

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AWS B2.1-1-233:2020
An American National Standard

Approved by the
American National Standards Institute
July 31, 2019

Standard Welding Procedure Specification (SWPS) for 75% Argon Plus 25% Carbon Dioxide Shielded Gas Metal Arc Welding (Short Circuiting Transfer Mode) followed by 98% Argon Plus 2% Oxygen Shielded Gas Metal Arc Welding (Spray Transfer Mode) of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8 inch [3 mm] through 1-1/2 inch [38 mm] Thick, ER70S-3, in the As-Welded or PWHT Condition, Primarily Pipe Applications

2nd Edition

Revises AWS B2.1-1-233:2006

Prepared by the
American Welding Society (AWS) B2 Committee on Procedure and Performance Qualification

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

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Item 20-7

Routine repairs of Div.2 & or Div.3 vessels

Part 3, 3.3.2 a)

Submitted by: Paul Shanks

Explanation of Need: An interpretation is scheduled to be issued under item number 19-26 asserting that Routine repairs are not to be used on Div.2 or Div.3 vessels. Rather than require review of an interpretation which may expire in two years the body of the code should make it clear that Routine repairs are not compatible with div.2 or div.3 vessels.

Background Information: 3.3.5.2 b) makes clear that an Inspector will make the acceptance inspection and sign the R1, the provision in 3.3.2 to waive the AI involvement or routine repairs is simply not applicable.

Proposed Change:

3.3.2 ROUTINE REPAIRS

a) Routine repairs are repairs for which the requirements for in-process involvement by the Inspector and stamping by the "R" Certificate Holder may be waived as determined appropriate by the Jurisdiction and the Inspector. ~~As such r~~Routine repairs are not ~~acceptable~~permitted for ASME Section VIII Div.2 or Div. 3 vessels. All other applicable requirements of this code shall be met. Prior to performing routine repairs, the "R" Certificate Holder should determine that routine repairs are acceptable to the Jurisdiction where the pressure-retaining item is installed;

INTERPRETATIONS, CODE ADDITIONS AND CODE REVISIONS

The NBIC Committee meets regularly to consider requests for interpretations, revisions, and additions for this code. Interpretations are provided for each part and are specific to the code edition and addenda referenced in the interpretation and may be used with subsequent editions of the NBIC, provided the requirements have not changed. Interpretations provide clarification of existing rules in the code only and are not part of this code. Code revisions and additions are considered to accommodate technological developments, address administrative requirements, or to clarify code intent.

Item 20-9: Request for Revision to NBIC Section 9: Glossary of terms

Parts 1, 2, 3 and 4 9.1

Purpose	Define "Verify" and “Witness” in the NBIC Part 1, 2, 3, and 4 to align with the definition in NB-263, RCI-1, Rules for Commissioned Inspectors
Scope	Add “Verify” and “Witness” to the terms defined in Section 9 of Parts 1, 2, 3 and 4
Background	The need for the definition of "verify" and “witness” was initiated from Interpretation Item 18-03, which addresses which Inspector (i.e. “IS” Commissioned or “R” Endorsement) signs the FFSA Form NB-403 when an “R” Certificate Holder is involved with a repair in that region as well as determine what level of review of the Fitness-for-Service the Inspector is expected to complete.
Proposed Revision	Verify – To determine that a particular action has been performed in accordance with the requirements either by witnessing the action or reviewing records. Witness – To be present at an event and have first-hand knowledge of the action and be able to attest that it occurred.

Submitted by: Terry Hellman

Proposed Change:

9.1 DEFINTIONS

Verify – To determine that a particular action has been performed in accordance with the requirements either by witnessing the action or reviewing records.

Witness – To be present at an event and have first-hand knowledge of the action and be able to attest that it occurred.

Item 20-9: Request for Revision to NBIC Section 9: Glossary of terms
Parts 1, 2, 3 and 4 9.1

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Background	The need for the definition of "verify" and “witness” was initiated from Interpretation Item 18-03, which addresses which Inspector (i.e. “IS” Commissioned or “R” Endorsement) signs the FFSA Form NB-403 when an “R” Certificate Holder is involved with a repair in that region as well as determine what level of review of the Fitness-for-Service the Inspector is expected to complete.
Proposed Revision	Verify – To determine that a particular action has been performed in accordance with the requirements either by witnessing the action or reviewing records. Witness – To be present at an event and have first-hand knowledge of the action and be able to attest that it occurred.

Submitted by: Terry Hellman

Proposed Change:
9.1 DEFINTIONS

Verify – To determine that a particular action has been performed in accordance with the requirements either by witnessing the action or reviewing records.

Witness – To be physically present, or remotely present as allowed, to confirm an event or condition is true and accurate.

This verbiage was proposed by Part 2 SG, however the verbiage as shown on Page 1 of this attachment was what was approved by the Part 3 SG.

Subject Code Revision to Part 3, 3.3.4.8

File Number NB20-10 **Prop. on Pg.**

Proposed Revision Statement of Need The revision is to clean up language in NBIC Part 3, 3.3.4.8 and to add clarification regarding the inspector required to sign form NB-403 (current request for interpretation linked to this need in Item 20-3).

Project Manager John Siefert/G. Galanes

SubGroup Negatives **SG Meeting Date**

Background:
The current language in the NBIC Part 3, 3.3.4.8 makes multiple references to 'repair' and/or 'weld repair' which might confuse the reader. This language needs to be clarified so it is explicit in 3.3.4.8 b) "…One or more fitness-for-service engineering evaluation methods as described in NBIC Part 2, 4.4 shall be used to determine whether the defect may remain, either in part or in whole, in the pressure-retaining item…"

The current language in the NBIC Part 3, 3.3.4.8 needs to reference the correct forms and sections in Part 2 to avoid confusion.

A request for interpretation (current Item 20-3) was made referencing Part 3, 3.3.4.8 in regard to whether the National Board Inspector holding either an "IS" Commission or an "R" Endorsement is required to sign form NB-403. Language is added to 3.3.4.8 c) 5) to clarify this point.

Proposal, rev 0, July 13, 2020

3.3.4.8 REPAIR OF PRESSURE-RETAINING ITEMS WITHOUT COMPLETE REMOVAL OF DEFECTS

a) There may be cases where removal of a defect in a pressure-retaining item is not practical at the time the defect is found. In such cases, with approval of the Inspector and, when required, the Jurisdiction, an engineering evaluation shall be performed to determine the scope of the repair and impact to safety prior to returning the pressure-retaining item to service for a specified period of time. The engineering evaluation shall be performed by an organization with demonstrated competency in defect (and flaw) characterization of pressure-retaining items. The method of defect evaluation and time interval for returning the pressure-retaining item back to service shall be as agreed upon by the Inspector, and when required, the Jurisdiction. The specified period of time the defect can remain in service after weld repair shall be based on no measureable defect growth during subsequent inspections, or a period of time as specified by the Jurisdiction, if applicable. This repair method is not permitted for vessels used in lethal service, vessels designed for high-cycle operation or fatigue service, compressed air storage, and in cases where high stress concentration cannot be reduced by weld repair. This repair method is not permitted for DOT vessels.

b) One or more fitness-for-service engineering evaluation methods as described in NBIC Part 2, 4.4 shall be used to determine whether the defect may remain, either in part or in whole, in the pressure-retaining item. If it is determined that the defect can remain in the item, a risk-based inspection program shall be developed as described in NBIC Part 2, 4.5 to assure inspection of the defect and monitoring of defect growth over time. This program shall be a controlled and documented inspection program that specifies inspection intervals as agreed upon with the Inspector and, when required, the Jurisdiction, and shall be maintained until the defect can be completely removed and the item repaired.

c) The following requirements shall apply to the weld repair of pressure-retaining items without complete removal of defects:

1) Engineering evaluation of the defect in the pressure-retaining item shall be conducted using one or more fitness-for-service condition assessment method(s) as described in NBIC Part 2, 4.4. Engineering evaluation of the condition assessment results shall be performed by an organization that has demonstrated industry experience in evaluating pressure-retaining items ~~as referenced in NBIC, Part 2, S5.3~~. If the fitness-for-service engineering evaluation requires finite element analysis (FEA), the requirements in NBIC Part 2, 4.6 and NBIC Part 2, Supplement 11 shall be met.

2) If engineering evaluation indicates a defect can remain in the pressure-retaining item, a risk-based inspection program shall be developed and implemented based on review and acceptance by the Inspector and, when required, the Jurisdiction. The risk-based inspection program shall be in accordance with the requirements in NBIC, Part 2 4.4.

3) The fitness-for-service condition assessment and risk-based inspection programs shall remain in effect for the pressure-retaining item until such time that the defect can be completely removed and the item repaired. The fitness-for-service condition assessment method, results of assessment, and method of weld repair, if applicable, shall be documented on a Report of Fitness for Service Assessment (FFSA) Form as described in NBIC Part 2, 4.4.1 and shall be filed with the Jurisdiction, when required.

4) When weld repairs are performed without complete removal of the defect(s), this shall be noted on the Form R-1 in the description of the work. The "R" Stamp Holder performing the weld repairs shall pro-vide detailed information on the Form R-1, describing the method, and extent, of repair and include the specific location of the weld repair on the item.

5) The interval to either re-inspect or remove the item from service or perform weldfor repair shall be determined based on a risk-based inspection program developed and implemented as required by NBIC Part 3, 3.3.4.8 NBIC Part 2, 4.5. The inspection interval shall not exceed the remaining life of the item, and shall be documented on the FFSA Form Form NB-403 and in the Remarks section of the Form R-1. The FFSA FormForm NB-403 shall be affixed to the Form R-1 when weld repairs are performed in NBIC Part 3, 3.3.4.8. A National Board Commissioned Inspector holding an "R" endorsement as described in NB-263, RCI-1 shall sign both the Form R-1 and the attached Form NB-403.

6) A copy of the completed Form R-1 with the completed FFSA FormForm NB-403 attached may be registered with the National Board, and when required, filed with the Jurisdiction where the item was installed.

Comment [SJ1]: To address concerns in Item 20-3

3.3.2 ROUTINE REPAIRS

a) Routine repairs are repairs for which the requirements for in-process involvement by the Inspector. ~~and stamping by the "R" Certificate Holder may be waived as determined appropriate by the Jurisdiction and the Inspector~~. All other applicable requirements of this code shall be met. Prior to performing routine repairs, the "R" Certificate Holder should determine that routine repairs are acceptable to their Repair Inspector and the Jurisdiction, where the pressure-retaining item is installed;

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b) The Inspector, with the knowledge and understanding of jurisdictional requirements, shall be responsible for meeting jurisdictional requirements and the requirements of this code;

c) The "R" Certificate Holder's Quality System Program shall describe the process for identifying, controlling, and implementing routine repairs. Routine repairs shall be documented on Form R-1 with this statement in the Remarks section: "Routine Repair";

5.7.2 STAMPING REQUIREMENTS FOR REPAIRS

a) Pressure-retaining items repaired in accordance with the NBIC shall be stamped as required by this section.

b) ~~Subject to the acceptance of the Jurisdiction and the concurrence of the Inspector, nameplates and stamping may not be required for routine repairs (see NBIC Part 3, 3.3.2). In all cases, the type and extent of repairs necessary shall be considered prior to waiving the requirement.~~

c) Stamping or ~~nameplate~~ repair name plate shall be applied adjacent to the original manufacturer's stamping or repair name ~~name~~plate. A single ~~repair~~repair name ~~name~~plate or stamping may be used for more than one ~~repair~~repair to a pressure-retaining item, provided each is carried out by the same certificate holder. The date of each repair, corresponding with the date on associated Form R-1, shall be stamped on the repair name ~~name~~plate.

5.7.3 STAMPING REQUIREMENTS FOR ALTERATIONS

Pressure-retaining items altered in accordance with this code shall have a ~~name~~repair name plate or stamping applied adjacent to the original manufacturer's stamping or ~~name~~repair name plate in accordance with this section. For an alteration where physical changes are made to the pressure-retaining item, the "R" Certificate Holder responsible for the construction portion of the alteration shall apply the stamping or ~~name~~repair name plate. For an alteration where no physical changes are made to the pressure-retaining item (e.g., a re-rating) the "R" Certificate Holder, assuming responsibility for the design, shall apply the stamping or ~~name~~repair name plate.

5.7.4 STAMPING REQUIREMENTS FOR PARTS

Stamping or ~~name~~repair name plate shall be applied in a conspicuous location on the part.

5.7.5 SPECIFIC REQUIREMENTS FOR STAMPING AND ~~NAME~~REPAIR NAME PLATES

a) Required data shall be in characters of at least 5/32 in. (4 mm) high, except that characters for pressure relief valve ~~repair name~~repair name plates may be smaller. Markings may be produced by casting, etching, embossing, debossing, stamping, or engraving. The selected method shall not result in any harmful contamination, or sharp discontinuities to, the pressure-retaining item. See NBIC Part 3, Figures 5.7.5-a through 5.7.5-e.

b) The National Board Code Symbols ("R","VR", and "NR") are to be stamped; do not emboss.

c) Stamping directly on items, when used, shall be done with blunt-nose continuous or blunt-nose interrupted dot die stamps. If direct stamping would be detrimental to the item, required markings may appear on a ~~name~~repair name plate affixed to the item.

d) The certificate holder shall use its full ~~name~~ name as shown on the *Certificate of Authorization* or an abbreviation acceptable to the National Board.

e) The letters "RP" shall be stamped below the "R" Symbol Stamp to indicate organizations accredited for performing repairs or alterations to fiber-reinforced plastic items.

f) The letter “G” shall be stamped below the “R” Symbol Stamp to indicate organizations accredited for performing repairs or alterations to graphite pressure equipment.

g) The subject ~~name~~repair name plate shall be securely attached using a method compatible with the structure or stand-off bracket supporting the ~~name~~repair name plate, in a manner that will impede easy removal. The method of attaching this ~~name~~repair name name plate, as permitted by the original code of construction, may include, but is not limited to:

1) Welding
2) Adhesive, bonding or cementing
3) Tamper-resistant mechanical fasteners of suitable metal construction

Item 20-16
Part 3, 3.4.4
Submitted by: Paul Shanks

Explanation of Need: ASME Section VIII Div.1 Mandatory Appendix 44 paragraph 44-6.2(g) clearly sets out that a vessel built to those rules needs to be re-stretched, having had repair welding. It is not clear if ASME is referring to in process (at the original manufactures location) repairs or post construction repairs. However, the NBIC is currently silent on this and this potential issue should be addressed.

Background Information: ASME Section VIII Div.1 Mandatory Appendix 44 establishes rules that allow a vessel to be designed and built for use at low temperatures using allowable stresses which are higher than would normally be allowed at 'room temperature'. The condition for doing so is that said vessels are subject to a pre-stressing operation that actually stretches the base material. The use of these higher stresses is contingent on certain design and manufacturing criteria.

Proposed Change:
3.4.4 EXAMPLES OF ALTERATIONS

a) An increase in the maximum allowable working pressure (internal or external) or temperature of a pressure- retaining item regardless of whether or not a physical change was made to the pressure-retaining item;

b) A decrease in the minimum temperature;

c) The addition of new nozzles or openings in a boiler or pressure vessel except those classified as repairs;

d) A change in the dimensions or contour of a pressure-retaining item;

e) In a boiler, Heat Recovery Steam Generator (HRSG), or Pressure Retaining Item (PRI), an increase in the steaming capacity by means of increasing heating surface, total heat input, firing rate, adjustment, or other modification to the primary or auxiliary heat source, resulting in the steaming capacity exceeding the original Manufacturer's Minimum Required Relieving Capacity (MRRC) as described on the nameplate and or Manufacturer's Data Report (MDR);

f) The addition of a pressurized jacket to a pressure vessel;

g) Except as permitted in NBIC Part 3, 3.3.3 s); replacement of a pressure retaining part in a pressure retaining item with a material of different allowable stress or nominal composition from that used in the original design;

h) The addition of a bracket or an increase in loading on an existing bracket that affects the design of the pressure-retaining item to which it is attached;

i) The replacement of a pressure relieving device (PRD) as a result of work completed on a pressure-retaining item (PRI) that changes the resultant capacity to exceed the minimum required relieving capacity (MRRC) required by the original code of construction as described on the original Manufacturer's Data Report;

j) For plate heat exchangers, in addition to the applicable examples of alterations above, the following changes from what is listed on the MDR or described on the Original Equipment Manufacturer's (OEM)-drawing:

1) For heat transfer plates:
   a. A change in material grade or nominal thickness;
   b. A reduction in number beyond any minimum, or when no minimum is specified;
   c. An increase in number beyond any maximum, or when no maximum is specified;
   d. A change in model type;

2) Any change in material whether described at 3.3.3 s) or as described at 3.4.4 g):
   a. A change in connection bolt or frame compression bolt diameter or material grade;

k) Performing postweld heat treatment where none was originally performed on the pressure retaining item; ~~and~~

l) The installation of a welded leak box~~.~~; and

m) Welding on a vessel, marked with the cold stretching 'CS' mark, without subsequent renewed cold stretching operations witnessed by the Inspector.

Item 20-20

Revision to Part 3, 3.2.2 e)

Part 3, 3.2.2 e)

Submitted by: Eric Feeney – efeeney@teiservices.com

Explanation of Need: The certificate holder should not have to explain or justify why a part was not pressure tested in the manufacturing stage. PG-106.8 of Section I allows the part to be fabricated and shipped as such therefore no explanation should be required.

Background Information: The certificate holder is rarely the supplier of the replacement parts. Parts are typically supplied by the owner or OEM. The current wording places the onus on the certificate holder to explain why the parts were not tested in accordance with the original code of construction. (Section I for the inquirer) The reason is most likely a cost savings to the supplier and even if it was, the certificate holder has no authority to rectify this. My company, for one, takes ownership of the parts at the time of receipt inspection at the site of installation.

Proposed Change:

3.2.2 REPLACEMENT PARTS

e) Replacement parts addressed by 3.2.2 c) or d) above shall receive a pressure test as required by the original code of construction. If replacement parts have not been pressure tested as required by the original code of construction prior to installation they may be installed without performing the original code of construction pressure test provided the owner, the Inspector and, when required, the Jurisdiction accept the use of one or a combination of the examination and test methods shown in Part 3, Section 4, paragraph 4.4.1 (for repairs) or 4.4.2 (for alterations). The R Certificate Holder responsible for completing the R Form shall note in the Remarks section of the R Form the examination(s) and test(s) performed~~, and the reason the replacement part was not tested in accordance with the original code of construction.~~.

Subject: NBIC Part 3, Qualification of Weld Procedures by Multiple Organizations

Proposal: To add words to 2.2.1 permitting simultaneous qualification of weld procedures by more than one organization.

Explanation: Cost of qualification of weld procedures can represent a considerable cost for a manufacturer for labor, materials, testing etc. Further, when new materials are being introduced to the industry, availability can be extremely limited. Section IX will introduce new rules (already board approved) under item 18-555 (provided in the background information), which provides the framework to allow multiple organizations to supervise the welding of a single test coupon. The rules only permit this when it is expressly permitted by the referencing code. This proposal intends to add words to 2.2.1 of Part 3 to allow Manufacturers to take advantage of the new rules coming to Section IX.

Such testing sessions have already taken place, organized by EPRI, for qualification of repair procedures for Welding Method 6 and Supplement 8.

Current Wording	Proposed Wording
2.2.1 PROCEDURE SPECIFICATIONS 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.	**2.2.1 PROCEDURE SPECIFICATIONS** 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. Welding procedures may be simultaneously qualified by more than one organization under the rules of ASME Section IX QG-106.4~~, provided that each organization accepts full responsibility for any such qualifications and complies with the other requirements of Section IX for documentation of welding records.~~ The "R" Certificate Holder's written quality control program shall include requirements for addressing the rules of Section IX QG-106.4.

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Existing Text:

QG-106.1 Procedure Qualifications. Each organization is responsible for conducting the tests required by this Section to qualify the procedures that are used in the construction of components under the rules of the Codes, standards, and specifications that reference this Section.
(a) The personnel who produce test joints for procedure qualification shall be under the full supervision and control of the qualifying organization during the production of these test joints. The persons producing test joints for the qualification of procedures shall be either direct employees or shall be personally engaged by contract for material-joining services.
(b) Production of qualification test joints under the supervision and control of another organization is not permitted. However, it is permitted to subcontract any or all of the work necessary for preparing the materials to be joined, the subsequent work for preparing test specimens from the completed test joint, and the performance of nondestructive examination and mechanical tests, provided the organization accepts full responsibility for any such work.
(c) If the effective operational control of procedure qualifications for two or more companies of different names exists under the same corporate ownership, the companies involved shall describe in their Quality Control System or Quality Assurance Program the operational control of procedure qualifications. In this case, separate procedure qualifications are not required, provided all other requirements of this Section are met.

Modified Text:

QG-106.1 Procedure Qualifications. Each organization is responsible for conducting the tests required by this Section to qualify the procedures that are used in the construction of components under the rules of the Codes, standards, and specifications that reference this Section.
(a) The personnel who produce test joints for procedure qualification shall be under the full supervision and control of the qualifying organization during the production of these test joints. The persons producing test joints for the qualification of procedures shall be either direct employees or shall be personally engaged by contract for material-joining services except as permitted in QG-106.4.
(b) Production of qualification test joints under the supervision and control of another organization is not permitted except as permitted in QG-106.4. However, it is permitted to subcontract any or all of the work necessary for preparing the materials to be joined, the subsequent work for preparing test specimens from the completed test joint, and the performance of nondestructive examination and mechanical tests, provided the organization accepts full responsibility for any such work.
(c) If the effective operational control of procedure qualifications for two or more companies of different names exists under the same corporate ownership, the companies involved shall describe in their Quality Control System or Quality Assurance Program the operational control of procedure qualif ications. In this case, separate procedure qualifications are not required, provided all other requirements of this Section are met.

ADD:

QG-106.4 Simultaneous Procedure Qualifications. When expressly permitted by the referencing code, welding procedures may be simultaneously qualified by more than one organization, provided that each organization accepts full responsibility for any such qualifications and the following requirements are met.
(a) Each participating organization shall be represented by an individual with responsibility for qualification of joining procedures, as detailed in QG-106.
(b) A preliminary joining procedure specification acceptable to the representatives of each participating organization shall be prepared addressing the essential and nonessential variables and, when applicable, the supplementary essential variables and other requirements as may be applicable that are to be observed for each process to be used for joining the test coupon(s). If any variables are revised during the joining of a test coupon, the revised variables shall be agreed upon by the representatives of each participating organization.
(c) Joining of the test coupon(s) shall be conducted under the simultaneous supervision of the representatives of each participating organization.
(d) The PQR shall document that the qualification was conducted under the provisions of QG-106.4.