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Interpretation IN15-0601

Proposed Interpretation

Inquiry:	IN15-0601
Source:	Mr. Nate Manzon, PMC Engineering Solutions
Subject:	NBIC Part 3 Section 3
Edition:	2013
Question 1:	May installation of a flush patch in a pressure retaining part be classified as a "Repair" if any of its attachment welds are made using a backing strip along with the welds receiving the same degree of volumetric examinations as original construction when the original vessel design and construction of the pressure retaining part did not use backing strips in its design and construction.
Reply 1:	No. If backing strips were not considered and used in the original design and construction, and are used on the flush patch installation, the work must be classified as an Alteration.
Question 2:	May installation of a flush patch in a pressure retaining part be classified as a "Repair" if any of its attachment welds are made using a backing strip along with the welds receiving a lesser or higher degree of volumetric examination such that the applicable flush patch butt weld design joint efficiency is lower or higher than original construction when the original vessel design and construction of the pressure retaining part did not use backing strips in its design and construction.
Reply 2:	No. If backing strips were not considered and used in the original design and construction, and are used on the flush patch installation, and if the applicable joint efficiency of the weld made using a backing strip is lower or higher than that of the joint efficiency used on the original design, there would be a change in the joint efficiency applicable to design of the part which would mandate that the work be classified as an Alteration.
Committee's Question:	
Committee's Reply:	
Rationale:	
SC Vote	
NBIC Vote	

Interpretation IN15-0901

Proposed Interpretation

Inquiry:	IN15-0901
Source:	Mr. Michael Goolsby, Austin Industrial
Subject:	NBIC Part 3
Edition:	2013
Question 1:	When you have the original vessel with nozzles installed and covers (blind flanges) placed on those nozzles by the fabricator. If you modify the blind flange by adding a nozzle on the outside of the blind flange. Would this be considered a repair?
Reply 1:	Yes
Question 2:	If you have an in-service vessel that has B31.3 piping flanged up to a nozzle on the vessel. The piping is removed and a blind flange installed. It is then decided to install a nozzle on the outside of the blind flange. Would this be considered a repair?
Reply 2:	<u>No</u> . The face of the flange was the end of the original Code boundary.
Question 3:	Is the outside surface of the blind flange or cover considered the end of the Code boundary per the NBIC?
Reply 3:	3)a) <u>Yes</u> Code stops at the outside of the blind flange. 3) b) <u>No</u> The Code stops at the flange face.
Committee's Question:	
Committee's Reply:	
Rationale:	
SC Vote	
NBIC Vote	

Interpretation IN15-1101**Proposed Interpretation**

Inquiry: IN15-1101
Source: Mr. Earl Tullis, Dow
Subject: NBIC 2013 Part 3 (3.2.6)
Edition:
Question: Is the use of ASME PCC-2 Article 2.12 Fillet Welded Patches an alteration?
Reply: Yes
Committee's Question: Are fillet welded patches permitted by the NBIC for repairs or alterations to pressure retaining items?
Committee's Reply: Fillet welded patches are not addressed by the NBIC.
Rationale: Alternative repair methods addressed by other referenced codes and standards may be permitted provided they are approved by the Inspector and Jurisdiction.

SC Vote
NBIC Vote

Proposed Alternate Q&R

Q: The Inspector and, as required, the Jurisdiction have accepted the use of ASME PCC-2, Article 2.12, for work on a pressure retaining item (PRI). Is the installation of a fillet welded patch meeting the limitations, design, fabrication, examination and testing requirements of ASME PCC-2, Article 2.12, considered an alteration to the PRI?

R: Yes.

Rationale: The NBIC defines an alteration as a change in the item described on the original manufacturer's data report which affects the pressure containing capability of the item.

Interpretation IN15-1301

Proposed Interpretation

Inquiry:	IN15-1301
Source:	Mr. Nathan Brink, Phillips 66
Subject:	NBIC Part 3, Section 3
Edition:	2013
Question 1:	Does 3.4.3 g / 3.3.3 s imply that a change of bolt material (for example on an exchanger girth flange or floating head due to availability, or increasing corrosion resistance) is an alteration/repair requiring an "R" form and stamp?
Reply 1:	No proposed reply given
Committee's Question:	
Committee's Reply:	
Rationale:	
SC Vote	
NBIC Vote	

Request for Interpretation

Robert V. Underwood

HSB Global Standards

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618-593-6231

ACTION ITEM No. : IN16-0101

Purpose	To determine if explosive welding of plugs into leaking heat exchanger tubes is considered a repair per the NBIC Part 3.
Scope:	Repairs to leaking vessel heat exchanger tubes by explosively welding plugs into them.
Background	<p>An “R” Certificate Holder asked if plugging leaking tubes in an ASME feedwater heater by the explosive welding process was considered a repair per the NBIC Part 3.</p> <p>Apparently, this is common repair to feedwater heaters installed in utilities throughout the U.S. It is also commonly accepted as a non-Code repair. Many of these companies who perform the tube plugging do not have “R” Certificates of Authorization.</p> <p>Some in the industry have the opinion that explosive “plugging” is not considered welding and is not a Code repair. However, the repair firms that perform explosive plugging advertise this as a welding process. Further, ASME Section IX defines <i>weld</i> as a localized coalescence of metals produced by heat or the <u>application of pressure</u>. Paragraph UW-27(a)(2) of ASME Section VIII, Div. 1 permits the explosive welding process and footnote 70 defines explosive welding as a solid state welding process wherein coalescence is produced by the <u>application of pressure</u> by means of explosion.</p> <p>Although the NBIC does not address explosive welding, the 2015 Edition now has rules for plugging of firetube boilers. Also, it is clear that the ASME Code defines explosive welding and the repair firms are claiming they are explosively welding these plugs into the tubes.</p>
Proposed Question	<p>Question: Is explosive welding of plugs into leaking pressure vessel tubes considered a repair per the NBIC Part 3?</p> <p>Proposed Reply: Yes</p>

Request for Interpretation

Monte Bost
HSB Global Standards

ACTION ITEM No. : IN16-0102

Purpose	Certification of National Board "R" Form
Proposed Question	Before signing the applicable National Board "R" Form, shall the Inspector verify the stamping and/or nameplate is correct and, where applicable, properly attached to the pressure retaining item?
Proposed Answer	Yes
Background	<p>NBIC Part 3, Section 1, 1.3.2(b) states before signing the R Form, the Inspector shall verify a number of items including all functions necessary to ensure compliance to the code have been satisfactorily performed.</p> <p>b) Before signing the appropriate NBIC Report Form, the Inspector shall review the drawings, ensure the repair or alteration was performed in accordance with the accepted code of construction or standard, witness any pressure test or any acceptable alternative test method applied, ensure that the required nondestructive examinations have been performed satisfactorily, and that the other functions necessary to ensure compliance with the requirements of this code have been satisfactorily performed.</p> <p>c) The Inspector shall verify the stamping or nameplate is correct and where applicable, the nameplate has been properly attached.</p> <p>NBIC Part 3, Section 5, 5.7.1 states that stamping of the pressure retaining item indicates the work was performed with the requirements of this code.</p> <p>5.7 STAMPING REQUIREMENTS FOR REPAIRS AND ALTERATIONS</p> <p>5.7.1 GENERAL</p> <p>The stamping of or attachment of a nameplate to a pressure-retaining item shall indicate that the work was performed in accordance with the requirements of this code. Such stamping or attaching of a nameplate shall be done only with the knowledge and authorization of the Inspector. The "R" Certificate Holder responsible for repair or the construction portion of the alteration shall apply stamping. For a re-rating where no physical changes are made to the pressure-retaining item, the "R" Certificate Holder responsible for design shall apply stamping.</p> <p>The Certificate of Inspection on the R Form states that to the best of his knowledge, the Inspector is certifying the work complies with the applicable requirements of the NBIC.</p>

CERTIFICATE OF INSPECTION

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

Date _____ Signed _____
(Inspector) (National Board and Jurisdiction no.)



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February 19, 2016

Mr. Brad Besserman
National Board of Boiler and Pressure Vessel Inspectors
1055 Crupper Ave.
Columbus, OH 43229-1183

Subj.: NBIC Interpretation Inquiry

Dear Mr. Besserman;

This letter is a written request for interpretation regarding the National Board Inspection Code, ANSI /NB-23 relating to the National Board “R” Symbol Stamp Quality System. The request is presented using the format of stating the question, presenting a suggested reply and an applicable background statement. The request involves three Quality System organization questions as outlined below and pertains to the subject of mergers and acquisitions.

Background – It has become common for two or more companies to join through mergers and acquisitions to subsidiaries operating under a common corporate umbrella. Each prior independent company is now a wholly owned subsidiary of the parent company. Assuming that each of the prior independent companies have a current Certificate of Authorization to use the “R” Code symbol stamp prior to the merger or acquisition, the following questions apply to the situation. See ASME Section IX Interpretation IX-83-03, Questions 2 & 3 as a precedence example (copy attached).

Question 1; May subsidiary companies retain independent Certificates of Authorization and separate Quality System Programs?

Reply 1; Yes – The quality system programs of subsidiary companies may retain independence. Each independent subsidiary must develop and maintain their quality system, quality program manual and Certificate of Authorization. However, it is recommended that the structure of the subsidiary company relationship with the parent company be noted in a revision to the affected quality system manuals and reviewed by the Jurisdiction and the Inspector.

Question 2; May the subsidiary companies under common corporate ownership exchange and use quality related documents and procedures?

Reply 2; Yes – Quality related documents and procedures may be exchanged and used between subsidiary companies under a common corporate owner provided that operational control is documented for each subsidiary company. Operational control is documented by amending the Quality System Manual of each company with the amendments reviewed and accepted by the Jurisdiction and the Inspector. The amendments must outline, at a minimum, the relationship of the subsidiary companies with the common corporate owner. Review and acceptance must be done prior to the exchange(s) taking place.

Question 3: - Must subsidiary companies now under a common corporate owner combine the Quality System Programs of each subsidiary into a single program that is applicable to all subsidiaries?

Reply 3: No – The Quality System Programs may remain stand alone, may have limited exchange of documentation or may restructure under a single common program as directed by business decisions and addressed in the Quality System Program Manuals. Any action to restructure former independent programs under a single new common replacement program would consist of terminating the existing independent Certificates of Authorization and replacing them with a new single Certificate of Authorization. The process for the new replacement program would involve the same development, review and audit in the same manner as the accreditation process for a new application.

Please forward this request to the applicable NBIC committee as necessary for review and reply. Please feel free to contact me if you have any questions or would like to discuss this matter further.

Thank you,

A handwritten signature in black ink, appearing to read "Tim Bacha". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Tim Bacha
We Energies
Principal Engineer
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Interpretation Detail

Standard Designation: BPV Section IX

Edition/Addenda:

Para./Fig./Table No:

Subject Description: Section IX, QW-200

Date Issued: 07/02/1982

Record Number: BC82-056

Interpretation Number: IX-83-03

Question(s) and Reply(ies): Question (1): Is omission of an essential, nonessential (or supplementary essential) variable from a WPS interpreted to be a negative response for that variable?
Reply (1): No. The Code requires that every variable for the appropriate welding process or processes (QW-252 through QW-282) be listed on the WPS.

→ Question (2): Given the following situation: Company "A" was purchased by Company "B," and became a subsidiary of Company "B" on a given acquisition date. Are PQR's developed by Company "A" prior to the acquisition date acceptable for support of WPS's written by Company "B" after the acquisition date?

Reply (2): Yes, provided operational control is in accordance with QW-201 and is established to the satisfaction of the ASME Boiler and Pressure Vessel Committee.

→ Question (3): What support evidence (documentation) must an organization produce to show that companies of different names have satisfactorily demonstrated to the ASME Boiler and Pressure Vessel Committee operational control of welding procedure qualifications?

Reply (3): The quality control system must describe the operational control. It is expected that the operational control will have been accomplished when the quality control manual has been reviewed and accepted at the time of a survey or joint review for new Certificates of Authorization or renewal of expiring Certificates. At intervals between renewal of Certificates, proposed changes in the accepted Quality Control System Manual must be reviewed and accepted by your Authorized Inspection Agency prior to implementation.

Question (4): Must a manufacturer or contractor add a specific statement of Code qualification certification to the WPS?

Reply (4): No.

Question (5): Is the certification of PQR's required by QW-200.2 considered to meet the WPS Certification required by QW-201?

Reply (5): No, the certification of the PQR is separate from any certification requirements of the WPS.

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Dear Sir,

Thank you for your reply.

Please find below the background of the inquiry.

Background : - Heat exchanger has installed on remote offshore site in 2011. During routine inspection by the owners, it was revealed that tubesheet and channel flange needs clad restoration. Client wish to send these parts only to manufacturers' location for repair. Client will send the photograph of original nameplate and MDR of the vessel for identification. They do not wish the manufacturer or their inspector to visit the site due to security and logistic reasons. However, they will provide all the nameplate photos, MDR and GA drg to identify the parts. Also after completing the repair, they wish the manufacturer to send the R stamped nameplate to site. Client will install that nameplate on the correct vessel and send the photographs for verification to manufacturer and their Inspector.

Inquiry : Is this method of verification acceptable as per NBIC cl. 1.3.2.C) considering it as repair and not routine repair as PWHT is involved in the repair.

Expected reply : Yes / No

With best regards,

Pradeep Subhedar

NB12-0801

Gasketed Plate Heat Exchangers

<u>Subject</u>	Plate Heat Exchangers		
<u>File Number</u>	NB12-0801	Prop. on Pg.	2 thru 10
Proposed Revision	Add examples of routine repairs, repairs, and alterations for plate heat exchangers and revise R-1 form to include PHEs.		
<u>Statement of Need</u>	Because of the unique design of the PHE, the current ASME Pressure Vessel and NBIC Codes do not specifically address the design of PHE's, nor the potential repairs or alterations. This is intended to provide guidance to the industry and the Jurisdictions.		
<u>Project Manager</u>	Randy Cauthon		

SubGroup	R&A Specific		
SubGroup Negatives		SG Meeting Date	January 12, 2016

SubCommittee Negatives		SC Meeting Date	January 13, 2016
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Gasketed Plate Heat Exchangers

3.3 REPAIRS TO PRESSURE-RETAINING ITEMS

3.3.1 DEFECT REPAIRS

Before a repair is made to a defect in a welded joint or base metal, care should be taken to investigate its cause and to determine its extent and likelihood of recurrence.

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) Repairs falling within one or more of the following categories may be considered routine:
 - 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 sq. inches (64,520 sq. mm) or a thickness of 25% of nominal wall thickness or ½ inch (13 mm), whichever is less;
 - 4) Corrosion resistance weld overlay not exceeding 100 sq. in. (64,520 sq. mm).
 - 5) **In addition, the following on plate heat exchangers:**
 - a. **Removal and replacement of heat transfer plates identical material, grade, and thickness to those listed on the Manufacturer's Data Report;**
 1. **When the original *Manufacturer's Data Report* specifies a maximum number of heat transfer plates, a change in the number of plates that is less than the maximum listed. When a minimum is specified, the number of plates shall remain within the range given;**
 - b. **In kind replacement of threaded rod (e.g., connection bolts, frame compression bolts).**

3.3.3 EXAMPLES OF REPAIRS

- a) Weld repairs or replacement of pressure parts or attachments that have failed in a weld or in the base material;

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- b) The addition of welded attachments to pressure parts, such as:
- 1) Studs for insulation or refractory lining;
 - 2) Hex steel or expanded metal for refractory lining;
 - 3) Ladder clips;
 - 4) Brackets having loadings that do not affect the design of the pressure-retaining item to which they are attached; and
 - 5) Tray support rings.
- c) Corrosion resistant strip lining, or weld overlay;
- d) Weld buildup of wasted areas;
- e) Replacement of heat exchanger tubesheets in accordance with the original design;
- f) Replacement of boiler and heat exchanger tubes where welding is involved;
- g) In a boiler, a change in the arrangement of tubes in furnace walls, economizers, or super heater sections;
- h) Replacement of pressure-retaining parts identical to those existing on the pressure-retaining item and described on the original *Manufacturer's Data Report*. For example:
- 1) Replacement of furnace floor tubes and/or sidewall tubes in a boiler;
 - 2) Replacement of a shell or head in accordance with the original design;
 - 3) Rewelding a circumferential or longitudinal seam in a shell or head;
 - 4) Replacement of nozzles of a size where reinforcement is not a consideration.
- i) Installation of new nozzles or openings of such a size and connection type that reinforcement and strength calculations are not a consideration required by the original code of construction;
- j) The addition of a nozzle where reinforcement is a consideration may be considered to be a repair, provided the nozzle is identical to one in the original design, located in a similar part of the vessel, and not closer than three times its diameter from another nozzle. The addition of such a nozzle shall be restricted by any service requirements;
- k) The installation of a flush patch to a pressure-retaining item;
- l) The replacement of a shell course in a cylindrical pressure vessel;
- m) Welding of gage holes;
- n) Welding of wasted or distorted flange faces;
- o) Replacement of slip-on flanges with weld neck flanges or vice versa;
- p) Seal welding of buttstraps and rivets;
- q) Subject to the administrative procedures of the Jurisdiction and approval of the Inspector, the replacement of a riveted section or part by welding;
- r) The repair or replacement of a pressure part with a code-accepted material that has a nominal compo-

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sition and strength that is equivalent to the original material, and is suitable for the intended service; and

- s) Replacement of a pressure-retaining part with a material of different nominal composition and, equal to or greater in allowable stress from that used in the original design, provided the replacement material satisfies the material and design requirements of the original code of construction under which the vessel was built. The minimum required thickness shall be at least equal to the thickness stated on the original *Manufacturer's Data Report*.
- t) The replacement of a pressure relieving device (PRD) attached by welding, provided the replacement device's relieving capacity is equal to or greater than the PRD capacity required by the original code of construction.
- u) In addition, the following on plate heat exchangers:
 - 1) Weld repair of any pressure part;
 - 2) In kind replacement of endplates, connector nozzles (i.e., same dimensions, material, and rating);
 - 3) The addition or repair of load bearing attachments (e.g., welded feet, lifting lugs) to the endplates where postweld heat treatment is not required.

3.4.3 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, an increase in the heating surface or steaming capacity as described on the original 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) In addition, the following on plate heat exchangers from what is listed on the MDR:
 - 1) A change in heat transfer plate material or grade;
 - 2) A change in nominal thickness of heat transfer plates;
 - 3) A reduction in heat transfer plate count beyond any minimum;
 - 4) An increase in heat transfer plate count beyond any maximum;

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- 5) Reducing the heat transfer plate count when no minimum is specified;
- 6) Increasing the heat transfer plate count when no maximum is specified;
- 7) A change in connection bolt or frame compression bolt material or grade;
- 8) A change in connection bolt or frame compression bolt diameter;
- 9) A change in the material, grade, or thickness of any of the endplates;
- 10) A change in material, grade, or dimensions, of any nozzles;
- 11) A change to the minimum or maximum plate count in the vessel.

5.13.4.1 INSTRUCTIONS FOR COMPLETING NATIONAL BOARD FORM "R" REPORTS

These instructions are to be used when completing the National Board Form "R" Reports. When computer generated, the format of the form shall replicate the type and relative location of the information depicted on the Form "R" Reports shown in NBIC Part 3, 5.13.1 through 5.13.4.

- 1) The name and address of the "R" Certificate Holder performing the work as it appears on the "*Certificate of Authorization*". On a Form R-2, the organization that performed the design work will complete line 1a) and the organization completing the construction activities will complete line 1b).
- 2) When registering a Form "R" Report with the National Board, this line is solely designated for a unique sequential number assigned by the "R" Certificate Holder. When the "R" Form is not to be registered, indicate so by "N/A". As described in NBIC Part 3,5.6, a log shall be maintained identifying sequentially, any Form "R" registered with the National Board. For re-rating only, the Design Organization registers the Form R-2. Where physical work is also performed, the Construction Organization registers the Form R-2.
- 3) Name and address of the owner of the pressure-retaining item.
- 4) Name and address of plant or facility where the pressure-retaining item is installed.
- 5) Description of the pressure-retaining item, such as boiler or pressure vessel, or piping. Include the applicable unit identification.
- 6) Name of the original manufacturer of the pressure-retaining item. If the original manufacturer is unknown, indicate by, "unknown."
- 7) Document the serial number of the pressure-retaining item if assigned by the original manufacturer. If there is no serial number assigned or is unknown, indicate "unknown."

- 8) When the pressure-retaining item is registered with the National Board, document the applicable registration number. If the pressure-retaining item is installed in Canada, indicate the Canadian design registration number (CRN), and list the drawing number under "other." If the item is not registered, indicate, "none."
- 9) Identify the year in which fabrication/construction of the item was completed.
- 10) Indicate edition and addenda of the NBIC under which this work is being performed.
- 11) Indicate the name, section, division, edition, and addenda of the original code of construction for the pressure-retaining item. Also indicate the name, section, division, edition, and addenda of the construction code used for the work being performed. If code cases are used, they shall be identified in the "Remarks" section.
- 12) Provide a detailed summary describing the scope of work that was completed to a pressure retaining item (PRI). The information to be considered when describing the scope of work should include such items as, the nature of the repair or alteration (i.e. welding, bonding, cementing), the specific location of the work performed to the PRI, the steps taken to remove a defect or as allowed by 3.3.4.8 to remain in place, the method of repair or alteration described as listed in the examples of Part 3, Section 3 or supplemental section if applicable, and the acceptance testing and or examination method used in accordance with the NBIC. When additional space is needed to describe the scope of work, a Form R-4 shall be used and attached. Information determined to be of a proprietary nature need not be included, but shall be stated on the form.
- 13) Indicate test pressure applied.
- 14) As applicable, identify what parts manufactured by welding or bonding were introduced as needed to complete the scope of work. Indicate part, item number, manufacturer's name, stamped identification, and data report type or Certificate of Compliance.
- 15) Indicate any additional information pertaining to the work involved (e.g., routine repairs, code cases). For Form R-3, the part manufacturer is to indicate the extent he has performed any or all of the design function. If only a portion of the design, state which portion.
- 16) Type or print name of authorized representative of the "R" Certificate Holder attesting to accuracy of the work described.
- 17) Indicate National Board "R" Certificate or Authorization number.
- 18) Indicate month, day, and year that the "R" certificate expires.
- 19) Enter date certified.
- 20) Record name of "R" Certificate Holder who performed the described work, using full name as shown on the Certificate of Authorization or an abbreviation acceptable to the National Board.
- 21) Signature of authorized representative.
- 22) Type or print name of Inspector.
- 23) Indicate Inspector's Jurisdiction.
- 24) Indicate Inspector's employer.
- 25) Indicate address of Inspector's employer (city and state or province).
- 26) Indicate month, day, and year of inspection by Inspector. In case of routine repairs this shall be the month, day, and year the Inspector reviews the completed routine repair package.

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- 27) Signature of Inspector.
- 28) National Board commission number of Inspector, and when required by the Jurisdiction, the applicable State or Provincial numbers.
- 29) Document name and address of organization that purchased the parts for incorporation into the repair or alteration. If the part's origin is unknown or the part was built for stock, so state.
- 30) Document name of organization responsible for specifying the code design conditions, if known. If origin of design conditions are unknown, state "unknown."
- 31) Document name of organization responsible for performing the code design, if known. If code design organization is unknown, state "unknown."
- 32) Name, section, and division of the design code, if known. If the design is unknown, state "unknown"
- 33) Indicate code edition year used for fabrication.
- 34) Indicate code addenda date used for fabrication.
- 35) Indicate the code paragraph reference for formula used to establish the MAWP, if known. If the code reference of the formula is unknown, state "unknown."
- 36) If available, identify component by part's original name, function, or use the original equipment manufacturer's "mark or item number."
- 37) Indicate quantity of named parts.
- 38) Match line number references for identification of parts and description of parts.
- 39) Indicate manufacturer's serial number for the named part.
- 40) Indicate drawing number for the named part.
- 41) Indicate maximum allowable working pressure for the part, if known.
- 42) Use inside diameter for size: indicate shape as square, round, etc.
- 43) Indicate the complete material specification number and grade.
- 44) Indicate nominal thickness of plate and minimum thickness after forming.
- 45) Indicate shape as flat, dished, ellipsoidal, or hemispherical.
- 46) Indicate minimum thickness after forming.
- 47) Indicate outside diameter.
- 48) Indicate minimum thickness of tubes.
- 49) Complete information identical to that shown on the Form "R" to which this sheet is supplementary.
- 50) Indicate the Form "R" type. Example: Form R-1, Form R-2, Form R-3.
- 51) Indicate the reference line number from the Form R to which this sheet is supplementary.
- 52) Complete information for which there was insufficient space on the reference Form "R".
- 53) If applicable, document the unique purchase order, job, or tracking number, assigned by organization performing work.

- 54) Indicate the maximum allowable working pressure of the pressure-retaining item.
- 55) Indicate the type of repair, e.g., welded, graphite pressure equipment, ~~or~~ fiber-reinforced plastic pressure equipment, **or plate heat exchanger**.

Definition to be added into glossary:

Plate Heat Exchangers (PHE): An assembly of components consisting of heat transfer plates and its supporting frame. The frame provides structural support and pressure containment and may consist of fixed endplates, moveable endplates, an upper carrying bar and lower guide bar which provide plate alignment, and frame compression bolts. The gasketed, semi-welded gasketed, and fully welded heat transfer plates are compressed between the endplates by the frame compression bolts. Brazed heat transfer plates are stacked on top of each other and brazed together. The nozzles or connections may be located on any endplate.

Item NB14-0301, add Encapsulation as a method of altering a Pressure Retaining Item (PRI)**All New 3.4.3 Paragraph PROPOSED:****3.4.3 ENCAPSULATION**

Encapsulation is a method used to maintain the pressure retaining capability of pipe, fittings and valves an item (with the exception of fire tube boilers) by fabricating a new pressure containing boundary over the item in the form of a "welded leak box" as described by ASME PCC-2, Article 2.4.

- a) Except as required in 3.4.3 c)(1), ASME PCC-2 should be used as a guideline for the design of the welded leak box and fabrication shall be in accordance with the original code of construction, when practicable. Design of the encapsulation shall consider original design conditions, taking into account current service conditions and damage mechanisms. Use of this method shall be acceptable to the inspector and when required, the jurisdiction.
- b) The "R" Certificate Holder responsible for the design of the encapsulation shall ensure a Fitness for Service Assessment (FFSA) has been performed on the portion of the item being encapsulated in accordance with NBIC, Part 2, 4.4.1, supporting the continued service of the item. The leak box shall not remain in place beyond the calculated remaining life of the encapsulated portion of the pressure retaining item.
 - 1) The remaining life of the encapsulated pressure retaining item shall be documented on the Report of FFSA in the Remarks section. The Report of FFSA Form shall be affixed to the Form R-2 and identified in the Remarks section.
 - 2) The leak box shall fully encapsulate the thinned or leaking area, as specified in the FFSA, to the distance where the minimum required metal thickness is verified. Wall thickness shall be verified in the area to be welded.
 - 3) A Welded Leak Box shall not be used to encapsulate a crack unless it has been removed and repaired in accordance with Part 3, Paragraph 3.3.4.2 a).
- c) Hazards associated with welding on degraded components should be addressed with the Owner-User by the use of engineering controls, administrative controls and personal protective equipment.
 - 1) When the pressure retaining item will remain in service while implementing this method, the requirements and limitations described within ASME PCC-2, Part-1 shall be used in conjunction with ASME PCC-2, Part-2, Article 2.10.
 - 2) API RP-2201, "Safe Hot Tapping Practices in the Petroleum and Petrochemical Industries" may be used as a guideline for identifying hazards associated with welding to a component that is under pressure, including service restrictions.
- d) Visual examination shall be in accordance with the NBIC, Part 3, Paragraph 4.4.1 e).
- e) Completion of the FORM R-2 shall follow the requirements for PREPARATION, DISTRIBUTION, and REGISTRATION as described in Part 3, Section 5.

Additional actions required by accepting this item:

Revise the succeeding paragraph numbering order (ref.2015-edition) to:

3.4.4 EXAMPLES OF ALTERATIONS

Add "j": j) The installation of a welded leak box.

3.4.5 ALTERATIONS OF ASME CODE SECTION VIII, DIVISION 2 or 3, PRESSURE VESSELS**3.4.5.1 ALTERATION PLAN****SECTION 5, 5.13.2 FORM R-2, REPORT OF ALTERATION**

Page 1, line 7 of Form R-2, add underlined check box and script: FFSA Form (NB-493) is attached.

See FORM R-2 example, page-2

parentheses. In Part 2, Supplement 6 and Part 3, Supplement 6 regarding DOT Transport Tanks, the metric units are shown first with the U.S. customary units shown in parentheses.

U.S. customary units or metric units may be used with this edition of the NBIC, but one system of units shall be used consistently throughout a repair or alteration of pressure-retaining items. It is the responsibility of National Board accredited repair organizations to ensure the appropriate units are used consistently throughout all phases of work. This includes materials, design, procedures, testing, documentation, and stamping. The NBIC policy for metrication is outlined in each part of the NBIC.

ACCREDITATION PROGRAMS

Delete footnote 1

The National Board administers and accredits three specific repair programs¹ as shown below:

- "R".....Repairs and Alterations to Pressure-Retaining Items
- "VR".....Repairs to Pressure Relief Valves
- "NR".....Repair and Replacement Activities for Nuclear Items

Part 3, Repairs and Alterations, of the NBIC describes the administrative requirements for the accreditation of these repair organizations.

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

New Construction

Criteria for Acceptance of Authorized Inspection Agencies for New Construction (NB-360)

Inservice

Qualifications and Duties for Authorized Inspection Agencies (AIAs) Performing Inservice Inspection Activities and Qualifications for Inspectors of Boilers and Pressure Vessels (NB-369)

Owner-User

Accreditation of Owner-User Inspection Organizations (OUIO) (NB-371) Owners or users may be accredited for both a repair and inspection program provided the requirements for each accreditation program are met.

Federal Government

Qualifications and Duties for Federal Inspection Agencies Performing Inservice Inspection Activities (FIAs) (NB-390)

These programs can be viewed on the National Board Website at www.nationalboard.org. For questions or further information regarding these programs contact the National Board by phone at (614) 888-8320 or by fax at (614) 847-1828

CERTIFICATES OF AUTHORIZATION FOR ACCREDITATION PROGRAMS

Any organization seeking an accredited program may apply to the National Board to obtain a Certificate of Authorization for the requested scope of activities. A confidential review shall be conducted to evaluate the organization's quality system. Upon completion of the evaluation, a recommendation will be made to the National Board regarding issuance of a Certificate of Authorization.

Certificate of Authorization scope, issuance, and revisions for National Board accreditation programs are specified in the applicable National Board procedures. When the quality system requirements of the appropriate accreditation program have been met, a Certificate of Authorization and appropriate National Board symbol stamp shall be issued.

¹ Caution, some Jurisdictions may independently administer a program of authorization for organizations to perform repairs and alterations within that Jurisdiction.

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PART 3, SECTION 1 REPAIRS AND ALTERATIONS — GENERAL AND ADMINISTRATIVE REQUIREMENTS

1.1 SCOPE

- a) This part provides general requirements that apply when performing repairs and alterations to pressure-retaining items.
- b) This part describes the administrative requirements for the accreditation of repair organizations.² Delete footnote 2
- c) The National Board administers three specific accreditation programs:
 - “R” — Repairs and Alterations to Pressure-Retaining Items
 - “VR” — Repairs to Pressure Relief Valves
 - “NR” — Repair and Replacement Activities for Nuclear Items

1.2 CONSTRUCTION STANDARDS FOR PRESSURE-RETAINING ITEMS

- a) When the standard governing the original construction is the ASME Code or ASME RTP-1, repairs and alterations to pressure-retaining items shall conform, insofar as possible, to the section and edition of the ASME Code most applicable to the work planned.
- b) If the pressure-retaining item was not constructed to a construction code or standard, or when the standard governing the original construction is not the ASME Code or ASME RTP-1, repairs or alterations shall conform, insofar as possible, to the edition of the construction standard or specification most applicable to the work. Where this is not possible or practicable, it is permissible to use other codes, standards, or specifications, including the ASME Code or ASME RTP-1, provided the “R” Certificate Holder has the concurrence of the Inspector and the Jurisdiction where the pressure-retaining item is installed.
- c) For historical boilers, the 1971 Edition of Section I of ASME Boiler Code, Part PR and PFT provides the many pressure-related components and features of construction encountered in firetube boilers.
- d) For pressure relieving devices the applicable standard for new valves to be used for reference during repairs is the ASME Code. ASME Code Cases shall be used for repairs when they were used in the original construction of the valve. ASME Code Cases may be used when they have been accepted for use by the NBIC Committee and the Jurisdiction where the pressure-retaining item is installed.
 - 1) For pressure relieving devices the code case number shall be noted on the repair document and, when required by the code case, stamped on the repair nameplate.
 - 2) The Jurisdiction where the pressure-retaining item is installed shall be consulted for any unique requirements it may have established.
- e) Piping systems are designed for a variety of service conditions such as steam, water, oil, gas, or air. Design requirements for repairs and alterations are to meet the original code of construction or the code most appropriate for the repair or alteration. These systems shall be designed for the most severe conditions of pressure, temperature, loadings, and expected transients considered for normal operation. All pipe materials, fittings, and valves shall be rated for the maximum service conditions for normal operation. Design corrosion of piping systems should also be considered when determining types of materials and thicknesses.

² Caution: Some jurisdictions may independently administer a program of authorization for organizations to perform repairs and alterations within that Jurisdiction.

1.5 ACCREDITATION

- a) Organizations performing repairs or alterations to pressure-retaining items shall be accredited as described in this section, as appropriate for the scope of work to be performed.
- b) Organizations performing repairs outside the scope of the NBIC may be accredited and shall meet any additional requirements of the Jurisdiction where the work is performed.

1.5.1 ACCREDITATION PROCESS

- a) The National Board administers accreditation programs for authorization of organizations performing repairs and alterations to pressure-retaining items and/or pressure relief valves.
- b) Any organization may apply to the National Board to obtain a *Certificate of Authorization* for the requested scope of activities. A review shall be conducted to evaluate the organization's quality system. The individual assigned to conduct the evaluation shall meet the qualification requirements prescribed by the National Board. Upon completion of the evaluation, any deficiencies within the organization's quality system will be documented and a recommendation will be made to the National Board regarding issuance of a *Certificate of Authorization*.
- c) As part of the accreditation process, an applicant's quality system is subject to a review. National Board procedures provide for the confidential review resulting in recommendations to issue or not issue a *Certificate of Authorization*.
- d) The accreditation programs provide requirements for organizations performing repairs and alterations to pressure-retaining items. Depending upon the expected scope of activities at the time of review, organizations may be authorized to perform design only, metallic or non-metallic repairs, and/or alterations either in the shop only, field only, or shop and field. Repairs and/or alterations to metallic and non-metallic pressure-retaining items are made by welding, bonding and/or mechanical assembly.
- e) Organizations desiring to renew or obtain a National Board *Certificate of Authorization* shall apply to the National Board using forms obtained from the National Board. Application for renewal shall be made prior to the expiration date of the *Certificate of Authorization*.
- f) When an organization has plants or shops in more than one location, the organization shall submit separate applications for each plant or shop. The organization may perform repairs or alterations in its plants, shops, or in the field, provided such operations are described in the organization's Quality System. Delete footnote 3
- g) The Jurisdiction³ may audit the Quality System and activities of an organization upon a valid request from an owner, user, inspection agency, or the National Board.
- h) The NBIC Committee may at any time change the rules for the issuance of *Certificates of Authorization* and use of the "R" Symbol Stamp. These rules shall become binding on all certificate holders.

1.5.2 NATIONAL BOARD "R" SYMBOL STAMP

- a) All "R" Symbol Stamps shall be obtained from The National Board of Boiler and Pressure Vessel Inspectors. Authorization to use the "R" Symbol Stamp may be granted by the National Board at its absolute discretion to the certificate holder.
- b) The "R" Symbol Stamp is furnished on loan by the National Board for a nominal fee. Each organization

³ Jurisdiction: The National Board member Jurisdiction where the organization is located. Alternatively, where the Jurisdiction elects not to perform the review or where there is no Jurisdiction or where the Jurisdiction is the organization's Authorized Inspection Agency, The National Board of Boiler and Pressure Vessel Inspectors will represent the Jurisdiction. At the Jurisdiction's discretion, the Jurisdiction may choose to be a member of the review team if the Jurisdiction chooses not to be the team leader.

Move definition of "Jurisdiction to glossary.

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welding. Similar responsibility for nondestructive examination and heat treatment shall be described in the manual.

l) **Examinations and Tests**

Reference shall be made in the manual for examinations and tests upon completion of the repair or alteration.

m) **Calibration**

The manual shall describe a system for the calibration of examination, measuring, and test equipment used in the performance of repairs and alterations.

n) **Acceptance and Inspection of Repair or Alteration**

The manual shall specifically indicate that before the work is started, acceptance of the repair/alteration shall be obtained from an Inspector who will make the required inspections and confirm NBIC compliance by signing and dating the applicable NBIC Report Form ⁴ upon completion of the work.

o) **Inspections**

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

p) **Report of Repair or Alteration Form**

The manual shall indicate the title of the individuals responsible for preparing, signing, and presenting the NBIC Report Forms to the Inspector. The distribution of the **NBIC Report Forms⁴** shall be described in the manual.

Delete footnote 4

q) **Exhibits**

Any forms referenced in the manual shall be included. The form may be a part of the referencing document or included as an appendix. For clarity, the forms may be completed and identified as examples. The name and accepted abbreviations of the "R" Certificate Holder shall be included in the manual.

r) **Construction Code**

The manual shall include provisions for addressing the requirements that pertain to the specific construction code for the equipment being repaired or altered.

s) **Nonconforming Items**

There shall be a system acceptable to the Inspector for the correction of nonconformities. A nonconformance is any condition that does not comply with the applicable rules of the NBIC, construction code, jurisdictional requirements, or the quality system. Nonconformance must be corrected or eliminated before the repaired or altered component can be considered in compliance with the NBIC.

t) **Records Retention**

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

⁴ **NBIC Report Form:** National Board Form R-1 for Repair, Form R-2 for Alterations, Form R-3 for Fabricated Parts, or Form R-4 Report Supplementary Sheet.

- 3) If owner-user personnel will assist with repairs, provisions for the use of owner-user personnel shall be included; and
- 4) Provisions for use of owner-user measurement and test equipment, if applicable, shall be addressed.

(15) **1.8 "NR" PROGRAM REQUIREMENTS**

(15) **1.8.1 SCOPE**

- a) This section provides requirements that must be met for an organization to obtain a National Board *Certificate of Authorization* to use the "NR" Symbol Stamp for repair/replacement activities to nuclear items constructed in accordance with the requirements of the ASME Code or other internationally recognized codes or standards for construction or inservice inspection of nuclear facilities.
- b) For administrative requirements to obtain or renew a National Board "NR" *Certificate of Authorization* and the "NR" Symbol Stamp, refer to National Board Procedure **NB-417⁵**, Accreditation of "NR" Repair Organizations.

Delete footnote 5

(15) **1.8.2 GENERAL**

- a) An organization applying for an "NR" *Certificate of Authorization* shall have a written Quality Assurance Program (QAP) that details the specific requirements to be met based on the intended category of activities selected by that organization as described below and shown in Table 1.8.2. Controls used, including electronic capabilities, in the Quality Assurance Program shall be documented in a Quality Assurance Manual (QAM). Controls required to be included within the QAM shall include who, what, when, where, why and how with an understanding that the how can be a reference to an implementation procedure or instruction. Quality activities to be described in the Quality Assurance Program is identified in Section 1.8.5 of this part. Applicants shall address all requirements in their Quality Assurance Program based on the category of activity and scope of work to be performed (organization's capabilities) to which certification is requested.
- b) Category 1
Any ASME Code certified item or system requiring repair/replacement activities irrespective of physical location and installation status prior to fuel loading.
- c) Category 2
After fuel loading, any item or system under the scope of ASME Section XI requiring repair/replacement activities irrespective of physical location.
- d) Category 3
Items constructed to codes or standards other than ASME, requiring repair/replacement activities irrespective of physical location, installation status and fuel loading.

⁵ Requirements for Accreditation of "NR" Repair Organizations NB-417, may be found on the NB website www.nationalboard.org under tab "Stamps and Marks."

(15) **TABLE 1.8.2.1**
ACRONYMS

ASME	American Society of Mechanical Engineers
Applicant	An Organization applying for "NR" <i>Certificate of Authorization</i> (new or renewal)
CFR	Code of Federal Regulations
Code	ASME Code of Construction, Section III, Division I, (NCA, NB, NC, ND, NE, NF, NG, and NH) or ASME Section XI Rules for Inservice Inspection of Nuclear Power Plant Components as applicable.
Jurisdiction	Enforcement Authority
NB	National Board of Boiler and Pressure Vessel Inspectors
NBIC	National Board Inspection Code
NB-263	Rules for National Board Inservice and New Construction Commissioned Inspectors
NCA	ASME Section III, Subsection NCA, General Requirements for Division 1 and Division 2
NQA-1*	ASME Quality Assurance Requirements for Nuclear Facility Applications
NR	Nuclear Repair
"NR" CH	"NR" Certificate Holder
QA	Quality Assurance
QAI-1	ASME Qualifications for Authorized Inspection
QAM	Quality Assurance Manual
QAP	Quality Assurance Program
QC	Quality Control
WA	ASME Section III, Division 3, Subsection WA, General Requirements

Note:

* Latest Edition endorsed by the Regulatory Authority

(15) **1.8.3 PREREQUISITES FOR ISSUING A NATIONAL BOARD "NR" CERTIFICATE OF AUTHORIZATION**

Before an organization can obtain a National Board "NR" *Certificate of Authorization*, the organization shall:

- a) Have and maintain an inspection agreement with an Authorized Nuclear Inspection Agency accepted in accordance with NB-360⁶ or accredited in accordance with NB-369⁷.
add title of NB-360 after NB-360 add title of NB-369 after NB-369
- b) Have a written Quality Assurance Program that complies with the requirements of this section and address all controls for the intended category and scope of activities.
- c) Have a current edition of the NBIC.

⁶ NB-360, Criteria for Acceptance of Authorized Inspection Agencies for New Construction.

⁷ NB-369, Qualifications and Duties for Authorized Inspection Agencies (AIAs) Performing Inservice Inspection Activities and Qualification of Inspectors of Boilers and Pressure Vessels.

- d) Have available ASME Section XI, the code of construction and referenced code sections and standards appropriate for the scope of work to be performed. ASME Section XI and codes of construction (Editions/Addenda) shall meet the requirements of the **Regulatory Authority⁸ and the owner.** delete footnote 8

1.8.4 OBTAINING OR RENEWING A NATIONAL BOARD "NR" CERTIFICATE OF AUTHORIZATION (15)

- a) Before an "NR" *Certificate of Authorization* will be issued or renewed, the applicant must have the Quality Assurance Program and the implementation of the program reviewed and found acceptable by representatives of the National Board, the Jurisdiction, and the Authorized Nuclear Inspection Agency. The Jurisdiction will be the National Board Member Jurisdiction in which the applicant is located or the location where the Quality Assurance Program is demonstrated/implemented. At the request of the Jurisdiction, or where there is no National Board Member Jurisdiction, the National Board representative shall act on behalf of the Jurisdiction. The implementation of the Quality Assurance Program shall be satisfactorily demonstrated by the organization. Demonstration of implementation shall meet the most stringent (classification) code requirements for the scope and category of work to be specified on the *Certificate of Authorization* or as requested by the applicant.
- b) If the applicant is an ASME "N" type *Certificate of Authorization* holder, has satisfactorily demonstrated within the last twelve (12) months the implementation of their Quality Assurance Program and can provide documentation that the organization is capable of implementing its Quality Assurance Program as being in compliance with this section, a further hardware verification implementation may not be necessary.
- c) The Regulatory Authority or Jurisdiction, upon request to the National Board, may attend the survey process for an "NR" *Certificate of Authorization* to be issued or renewed.
- d) The "NR" *Certificate of Authorization* holder shall be subject to an audit annually by the Authorized Nuclear Inspection Agency to ensure compliance with the Quality Assurance Program.

1.8.5 QUALITY ASSURANCE PROGRAM (15)

- a) An applicant or a holder of a National Board "NR" *Certificate of Authorization* ("NR" Certificate Holder) shall have and maintain a written Quality Assurance Program. The Quality Assurance Program shall satisfactorily meet the requirements of this section, and Jurisdictional and Regulatory requirements as applicable. The Quality Assurance Program may be brief or voluminous, depending on the circumstances. It shall be treated confidentially by the National Board and available for review by the Survey Team.
- b) Each applicant or "NR" Certificate Holder is responsible for establishing and executing a Quality Assurance Program. The applicant or "NR" Certificate Holder may subcontract activities needed to implement the Quality Assurance Program, as limited by ASME Section III and XI, but responsibility for adherence to the Quality Assurance Program remains with the Applicant or "NR" Certificate Holder.
- c) These rules set forth the requirements for planning, managing, and implementing the organization's Quality Assurance Program to control and ensure quality is performed and maintained during repair/replacement activities of components, items, parts, and systems for nuclear facilities. These rules are to be the basis for evaluating such programs prior to the issuance or renewal of the National Board "NR" *Certificate of Authorization*. Rules identified in subsections 1.8.6, 1.8.7 and 1.8.8 of this section detail the Quality Assurance Program requirements for each category of activity. These rules are established to meet and follow the requirements specified in NBIC Part 3, Table 1.8.2-1 of this section.

1.8.6 QUALITY ASSURANCE PROGRAM REQUIREMENTS FOR CATEGORY 1 ACTIVITIES (15)

⁸ **Regulatory Authority, A government agency, such as the United States Nuclear Regulatory Commission, empowered to issue and enforce regulations concerning the design, construction, and operation of nuclear power plants.** add to glossary

- e) The test material for the welding procedure qualification shall be of the same material specification (including specification type, grade, class, and condition of heat treatment) as the material being repaired. 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). In the event that the original material specification is obsolete, the test material used should conform as closely as possible to the original material used for construction based on nominal composition and carbon equivalent (IIW Formula),⁹ but in no case shall the material be lower in strength. delete footnote 9 and add formula into parenthetical
- (15) f) The qualification thickness for the test plates and repair groove depths shall be in accordance with ASME Section IX; for pressure retaining items repaired using this temper bead method, hardness testing and carbon equivalency requirements may be waived for ASME Section IX temper bead procedure qualification provided the pressure retaining item operates in steam service above 900°F (482°C).
- g) The organization making the repair shall include, when qualifying its WPS, sufficient tests to determine that the notch toughness of the weld metal and the heat-affected zone of the base metal in the "as-welded" condition is adequate at the minimum operating and pressure test temperatures (including start-up and shutdown). If for reasons of corrosion resistance, special hardness limits are necessary, such limits shall be included when qualifying the WPS.
- h) Notch toughness shall be determined and evaluated by Charpy impact tests in accordance with the provisions of the original code of construction at the temperature determined in accordance with NBIC Part 3, 2.5.3.2 d). Exemptions from impact testing described in the original code of construction are not applicable.
- i) For the welding process in NBIC Part 3, 2.5.3.2 c), use of austenitic or ferritic filler metals is permitted. For ferritic filler metals, use only electrodes and filler metals that are classified by the filler metal specification with a diffusible-hydrogen designator of H8 or lower. When shielding gases are used with a process, the gas shall exhibit a dew point that is below -60°F (-50°C). Surfaces on which welding will be done shall be maintained in a dry condition during welding and be free of rust, mill scale, and hydrogen producing contaminants such as oil, grease, and other organic materials.
- j) After the weld has been deposited flush with the base metal, a surface temper reinforcing weld layer shall be applied.
- k) For welds made by SMAW and FCAW, after completion of welding and without allowing the weldment to cool below the minimum preheat temperature, the temperature of the weldment shall be raised to a temperature of 450°F (232°C) minimum for a minimum period of two hours. This hydrogen bake-out treatment may be omitted provided the electrode used is classified by the filler metal manufacturer with a diffusible-hydrogen designator of H4 (e.g., E7018-H4).
- l) After the finished repair weld has cooled to ambient temperature, the surface temper reinforcing layer shall be removed substantially flush with the surface of the base material.

2.5.3.3 WELDING METHOD 3

When using this method, the following is required:

- a) This method may be used when the applicable rules of the original code of construction did not require notch toughness testing;
- b) The materials shall be limited to any P-No. 1 or P-No. 3 material as permitted for welded construction by the applicable rules of the original code of construction;
- c) The welding shall be limited to the SMAW, FCAW, and GTAW processes;

⁹ The IIW Carbon Equivalent Formula is $CE = C + Mn/6 + (Cr+Mo+V)/5 + (Ni+Cu)/15$. Elements are expressed in Weight Percent Amounts.

- d) The test material for the welding procedure qualification shall be of the same P-No. and Group No. as the base material specification of the repair. In the event that the original material specification is obsolete, the test material used should conform to the nominal composition and carbon equivalent (IIW Formula)¹⁰ as the material being repaired, but in no case shall the material be lower in strength;
delete footnote 10 and add formula into parenthetical
- e) If for reasons of corrosion resistance, special hardness limits are necessary, such limits shall be included when qualifying the WPS. For pressure retaining items repaired using this temper bead method, hardness testing and carbon equivalency requirements may be waived for ASME Section IX temper bead procedure qualification provided the pressure retaining item operates in steam service above 900°F (482°C);
- f) The qualification thickness for the test plates and repair groove depths shall be in accordance with ASME Section IX;
- g) The WPS shall be qualified in accordance with the temper bead procedure qualification requirements in QW-290 of ASME Section IX, and shall include the following additional requirements:
- 1) The minimum preheat temperature for welding shall be 350°F (177°C) and the maximum interpass temperature shall be 450°F (232°C);
 - 2) For the welding processes in NBIC Part 3, 2.5.3.3 c), use of austenitic or ferritic filler metal is permitted. For ferritic filler metals, use only electrodes or filler metals that are classified by the filler metal specification with a diffusible-hydrogen designator of H8 or lower may be used. When shielding gases are used with a process, the gas shall exhibit a dew point that is below -60°F (-50°C). Surfaces on which welding will be done shall be maintained in a dry condition during welding and be free of rust, mill scale, and hydrogen producing contaminants such as oil, grease, and other organic materials;
 - 3) After completion of welding using SMAW and without allowing the weldment to cool below the minimum preheat temperature, the temperature of the weldment shall be raised to a temperature of 450°F (232°C) minimum for a minimum period of two hours. This hydrogen bake-out treatment may be omitted, provided the electrode used is classified by the filler metal manufacturer with a diffusible-hydrogen designator of H4 (e.g., E7018-H4);
 - 4) After the finished repair weld has cooled to ambient temperature, the final temper bead reinforcement layer shall be removed substantially flush with the surface of the base material.

2.5.3.4 WELDING METHOD 4

When using this method, the following is required:

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

For ASME Section VIII Division 2 pressure vessels, where application of PWHT on in-service vessels has been demonstrated to cause harm to vessel material, full thickness temper bead repairs are permitted. They shall be completed per NBIC Part 3, 3.3.5 with the following requirements:

- 1) The full thickness repair weld shall be verified as being full penetration.
 - 2) Volumetric examination of the full thickness weld shall be performed.
- b) The materials shall be limited to P-No. 4, Groups 1 and 2, and P-No. 5A steels as permitted for welded construction by the applicable rules of the original code of construction;

¹⁰ The IIW Carbon Equivalent Formula is $CE = C + Mn/6 + (Cr+Mo+V)/5 + (Ni+Cu)/15$. Elements are expressed in Weight Percent Amounts.

- c) The welding shall be limited to the SMAW, FCAW, GMAW or GTAW processes using low-hydrogen electrodes and filler metals classified by the filler metal specification with a diffusible-hydrogen designator of H8 or lower, and suitably controlled by maintenance procedures to avoid contamination by hydrogen producing sources. The surface of the metal prepared for welding shall be free of contaminants;
- d) The test material for the welding procedure qualification shall be of the same P-No. and Group No. as the original material specification for the repair. In the event that the original material specification is obsolete, the test material used shall conform to the nominal composition and carbon equivalent (I_{IIW} formula)¹¹ as the original material used for construction, and in no case shall the material be lower in strength; **delete footnote 11 and add formula into parenthetical**
- e) If for reasons of corrosion resistance, special hardness limits are necessary, such limits shall be included when qualifying the WPS;
- (15) f) The qualification thickness for the test plates and repair groove depths shall be in accordance with ASME Section IX. For pressure-retaining items repaired using this temper bead method, hardness testing and carbon equivalency requirements may be waived for ASME Section IX temper bead procedure qualification provided the pressure-retaining item operates in steam service above 900°F (482°C);
- g) The welding procedures (WPS) shall be qualified in accordance with the temper bead procedure qualification requirements in QW-290 of ASME Section IX, and shall include the following additional requirements:
- 1) The minimum preheat temperature for welding shall be 300°F (150°C) for P-No. 4 material and 400°F (200 °C) for P-No. 5A material. The preheat temperature shall be checked to ensure that 4 in. (102 mm) of the material or four times the material thickness (whichever is greater) on each side of the groove (or full thickness of joint for a groove weld) is maintained at the minimum temperature during welding. The interpass temperature shall not exceed 800°F (430°C). When the weld does not penetrate through the full thickness of the material, the minimum preheat and maximum interpass temperature need only be maintained for 4 in. (102 mm) or four times the depth of the repair weld (whichever is greater) on each side of the joint;
 - 2) For the welding processes in NBIC Part 3, 2.5.3.4 c), use of austenitic or ferritic filler metal is permitted. For ferritic filler metals, use only electrodes or filler metals that are classified by the filler metal specification with a diffusible-hydrogen designator of H8 or lower. When shielding gases are used with a process, the gas shall exhibit a dew point that is below -60°F (-50°C). Surfaces on which welding be done shall be maintained in a dry condition during welding and be free of rust, mill scale, and hydrogen producing contaminants, such as oil, grease, and other organic materials;
 - 3) After the weld has been deposited flush with the base metal, a surface temper reinforcing weld layer shall be applied;
 - 4) For welds made by the SMAW and FCAW processes, after completion of welding and without allowing the weldment to cool below the minimum preheat temperature, the temperature of the weldment shall be raised to 450°F (232°C) minimum for a minimum period of two hours. This hydrogen bake-out treatment may be omitted, provided the electrode used is classified by the filler metal manufacturer with a diffusible-hydrogen designator of H4 (e.g., E7018 H4);
 - 5) After the finished repair weld has cooled to ambient temperature, the surface temper reinforcing weld layer shall be removed substantially flush with the surface of the base metal (and for a fillet weld to the required size and suitable contour of the toes).

2.5.3.5 WELDING METHOD 5

When using this method, the following is required:

¹¹ The I_{IIW} Carbon Equivalent Formula is $CE=C+ Mn/6 + (Cr+Mo+V)/5 + (Ni+Cu)/15$. Elements are expressed in Weight Percent Amounts

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b) Authorized Inspection Agency Acceptance

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

3.4 ALTERATIONS**3.4.1 RE-RATING¹² Delete footnote 12 and use veribage of footnote as first sentence of 3.4.1**

Re-rating of a pressure-retaining item by increasing the maximum allowable working pressure (internal or external) or temperature or decreasing the minimum design metal temperature below which notch toughness testing is required by the original code of construction, shall be done only after the following requirements have been met to the satisfaction of the Jurisdiction at the location of the installation:

- a) Revised calculations verifying the new service conditions shall be prepared in accordance with the "R" Certificate Holder's Quality Control System. Establishing a higher joint efficiency to re-rate a pressure-retaining item is not permitted;
- b) All re-ratings shall be established in accordance with the requirements of the construction standard to which the pressure-retaining item was built;
- c) Current inspection records verify that the pressure-retaining item is satisfactory for the proposed service conditions;
- d) The pressure-retaining item has been pressure tested, as required, for the new service conditions. Any insulation, coatings, or coverings that may inhibit or compromise a meaningful pressure test shall be removed, to the extent identified by the Inspector;
- e) In lieu of pressure testing, alternative methods can be used to ensure the structural integrity of the re-rated pressure-retaining item. The alternative methods shall be documented and subject to review and approval by the Jurisdiction.

3.4.2 ALTERATIONS BASED ON ALLOWABLE STRESS VALUES

For re-rating or re-calculating a new minimum wall thickness for a pressure-retaining item using a later edition/addenda of the original code of construction or selected construction standard or code that permits use of higher allowable material stress values than were used in the original construction, the following requirements shall apply:

- a) The "R" Certificate Holder shall verify, by calculations and other means, that the re-rated item can be satisfactorily operated at the new service condition (e.g., stiffness, buckling, external mechanical loadings);
- b) The pressure-retaining item shall not be used in lethal service;
- c) The pressure-retaining item shall not be used in high-cycle operation or fatigue service (i.e., loadings other than primary membrane stress are controlling design considerations) unless the pressure-retaining item was originally designed for fatigue service and a fatigue analysis is performed;
- d) The pressure-retaining item shall have been constructed to the 1968 edition or later edition/addenda of the original code of construction;

¹² Re-rating: Except as provided for Yankee dryers in Supplement 5, this code does not provide rules for de-rating boilers or pressure vessels; however, when the MAWP and/or allowable temperature of a boiler or pressure vessel is reduced, the Jurisdiction where the object is installed should be contacted to determine if specific procedures should be followed.

PART 3, SECTION 6 REPAIR AND ALTERATION SUPPLEMENTS

SUPPLEMENT 1 STEAM LOCOMOTIVE FIRETUBE BOILER REPAIRS

S1.1 SCOPE

This supplement applies to all boilers attached to steam locomotives operating on track gaged 24 in. (610 mm) or greater.

S1.1.1 FEDERAL RAILROAD ADMINISTRATION (FRA)

delete footnote 13 and add ", which may be obtained at the FRA website" after 1999

The FRA rules for steam locomotive boilers are published in the *Code of Federal Regulations (CFR) 49CFR Part 230, dated November 17, 1999.*¹³ All locomotives under FRA jurisdiction are documented on FRA Form 4 as defined in 49CFR Part 230. This document is the formal documentation of the steam locomotive boiler and is required to be completed prior to the boiler being placed in service. This document shall be used as the data report for the boiler, applicable to all repairs and alterations performed. National Board "R" Certificate Holders shall document their repairs and/or alterations on National Board Forms R-1 or R-2. These reports shall be distributed to the owner-user of the boiler, who is required to incorporate them into a FRA Form 19, which becomes an attachment to the FRA Form 4. The design margin for all such repairs or alterations shall not be less than four, based on ultimate tensile strength of the material.

S1.1.2 REQUIREMENTS FOR WELDING ACTIVITIES

- a) Before performing any welding activities, consideration shall be given to ensure the weldability of locomotive boiler materials.
- b) Special jurisdictional approval may be required prior to starting welding activity on locomotive boilers.

S1.1.3 MATERIALS

- a) The older steels used in riveted construction were frequently rimmed steels, high in carbon, sulfur, phosphorus and hydrogen. The older steels were not melted to a fine grain practice and will typically have poor toughness properties.
- b) If welding is to be used to repair a pressure-retaining item that was manufactured using riveted construction, the repair organization should perform a chemical composition analysis on the steel plate base metal and rivet material to determine weldability. Specific quantities of carbon, manganese, sulfur, phosphorus, and aluminum shall be identified and included in the analysis. The result of the analysis shall be acceptable to the Inspector and Jurisdiction when required.

S1.1.3.1 MATERIAL LIST FOR STEAM LOCOMOTIVE BOILERS

Table S1.1.3.1 is intended as a basic guideline only and covers basic carbon steel and some alloy steel material specifications. Other alloy materials may be available for these applications if necessary.

(15)

- a) SA-516 steel is recommended for firebox repairs. It is a fine grain steel that accepts flanging and bending with less tendency to crack than coarse grain steels such as SA-515 or SA-285 Grade C.

¹³ Steam locomotive inspection and maintenance standards, which is now codified at 49 CFR Part 230, may be obtained at the FRA website.

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SUPPL. 1

S1.1.4 FORMULA AND CALCULATIONS FOR STEAM LOCOMOTIVE BOILERS

- a) Most steam locomotive boilers were manufactured in the first half of the 20th century or before. The calculations, formula, and shop practices used are now distant history and quite difficult to obtain. The rules for riveted construction were last published by ASME in Section I Code, 1971 Edition. ^{delete footnote 14}
- b) This supplement herein, is based in part on the **ASME Code, Section III, 1952 Edition,¹⁴** which was the last published edition of the Steam Locomotive Code. The railroad industry has attempted to collect the old formula and some shop practices. These have been published by The Engineering Standards Committee for Steam Locomotives, Inc. (ESC) as **Compendium, Volume 1, Compilation of Calculations.¹⁵** ^{delete footnote 15 and add "}, which may be obtained from the Strasburg Rail Road, P.O. Box 96, Strasburg, PA 17579 (717) 687-7421" ^{to end of sentence.}

S1.2 LOCOMOTIVE FIRETUBE BOILER REPAIRS**S1.2.1 REPAIR OF STAYBOLT HOLES**

- a) Staybolt holes may be repaired by welding, reaming, or retapping to a larger size or by installing a flush patch.
- b) If the staybolt hole was threaded and is to be repaired by welding, the threads shall be removed prior to welding.

S1.2.2 THREADED STAYBOLTS

- a) All threaded staybolts shall have either 11- or 12-thread pitch. Staybolt threads shall have a good close fit in sheets. Changing the staybolt thread pitch from 11 to 12 or the reverse shall be considered a repair.
- b) All staybolts shorter than 8 in. (200 mm) in length shall have telltale holes. Staybolt telltale holes in existing staybolts shall be 3/16 in. (5 mm) to 7/32 in. (5.5 mm) in diameter and at least 1-1/4 in. (32 mm) deep in the outer end. When staybolts 8 in. (200 mm) or less in length are replaced, they shall be replaced with staybolts that have a telltale hole 3/16 in. (5 mm) to 7/32 in. (5.5 mm) in diameter their entire length, or with ones that have a 3/16 in. (5 mm) to 7/32 in. (5.5 mm) diameter hole in each end, drilled a minimum of 1-1/4 in. (32 mm) deep. On reduced body staybolts, the telltale hole shall extend beyond the fillet and into the reduced section of the staybolt. Ball socket-type flexible staybolts may have telltale holes that extend from the threaded end of the bolt into the bolt head for a distance of one-third the spherical bolt head diameter.
- c) Telltale holes shall be reopened after driving and riveting heads.
- d) Staybolt length shall be sized so the length of bolt projecting through the sheet is not less than 1/8 in. (3 mm) and is sufficient to produce a full head after driving and riveting the head.
- e) The thread lead of both bolt ends and both firebox sheets shall be synchronized to permit the staybolt to be installed without stripping the threads.
- f) When riveting staybolt heads, the bolt's opposite end shall be bucked or braced to prevent damaging the staybolt's threads. Bracing can be done several ways, such as using a pneumatic holder or a heavy steel bucking bar. Driving the heads on both ends of the staybolt simultaneously, using two pneumatic rivet hammers (double gunning), is acceptable. Staybolts are to be driven in such a manner as to expand radially the staybolt body and threads into the sheet prior to forming the head. Merely driving over the head is not acceptable.

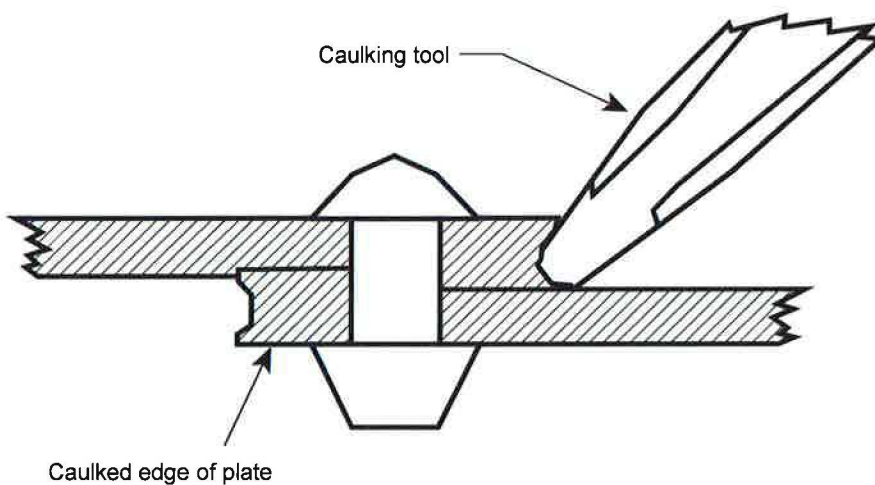
¹⁴ This code is available from the National Board.

¹⁵ Copies of *The Engineering Standards Committee for Steam Locomotives, Inc., Compendium, Volume 1, Compilation of Calculations*, may be obtained from the Strasburg Rail Road, P.O. Box 96, Strasburg, PA 17579, 717.687.8421.

- e) Reheating of rivets above 600°F (316°C) after the original installation is prohibited. When seal welding rivet heads, inter or post-pass head temperature shall be kept below 600°F (316°C).
- f) Each rivet head shall contact the plate over the entire circumference upon completion of the installation. Rivets on which either head does not have contact with the plate over the entire area of the driven head, not including any excess washer (excess material at the base of the rivet head), shall be replaced. Repair is prohibited.
- g) Caulking refers to the sealing of plate seams and rivet heads by driving the edge of one surface onto the other by using an impact tool.
- h) Caulked rivet seams and rivet heads shall be in accordance with ASME Code Section I, **Part PR, 1971 Edition**.¹⁶

Delete "Part PR, 1971 Edition" and footnote.

FIGURE S1.2.12.1



S1.2.12.2 THREADED OPENINGS IN VESSEL WALLS, BUSHINGS, AND WELDED NOZZLES (WASHOUT PLUG HOLES AND OTHER CONNECTIONS)

- a) Threaded openings in vessel walls and welded nozzles with damaged threads that cannot be repaired by retapping or rethreading should be repaired by welding a nozzle in the sheet. The nozzle shall be of such a size as to not interfere with proper washout and inspection.
- b) Threaded bushings and nozzles found to be defective shall be replaced. Seal welding is not permitted.
- c) New threaded bushings equipped with shoulders may be seal welded at the shoulder.
- d) New threaded bushings without shoulders that are seal welded after installation shall have the threads removed from the weld zone of the bushing prior to welding.
- e) Threaded holes with damaged threads may be repaired by weld buildup and re-tapping. The threads shall be removed prior to welding.

¹⁶ This code is available from the National Board.

Subject Final Revisions to New CSEF Supplement in Part 3

File Number NB16-1101

Prop. on Pg.

Proposed

Revision

See attached revisions as underlined.

Statement of

Need

The attached proposal contains final revisions in preparation for 2017 publication. These changes are IOU's based on an approved MC NBIC letter ballot vote.

Project Manager

Galanes/Siefert

SubGroup

0

SG Meeting Date

Negatives

Item NB16-1101

Supplement 11

WELD AND POST REPAIR INSPECTION OF CREEP STRENGTH ENHANCED FERRITIC STEELS

S11.1 SCOPE

The technical information provided in this supplement pertains to weld repair and post repair inspection of creep strength enhanced ferritic steel (CSEF) pressure retaining items. This Supplement provides guidance for full penetration and partial penetration weld repairs not covered under Welding Method 6 (2.5.3.6).

Creep Strength Enhanced Ferritic alloys (CSEF's) are a collection of ferritic steels whose creep strength is enhanced by the creation of a precise condition of micro-structure, specifically martensite or bainite, which is stabilized during tempering by controlled precipitation of temper-resistant carbides, carbo-nitrides, or other stable and/or meta-stable phases. Careful consideration shall be given to pressure-retaining items that are fabricated from CSEF's. The behavior of these materials in low temperature (i.e. fracture toughness and/or fatigue) and in high temperature (i.e. creep and/or creep-fatigue) components can be degraded by not adhering to the welding procedures and improper application of post-weld heat treatment (PWHT).

Post Construction access and in-service operation may not allow the practicable application of PWHT following original construction fabrication requirements and repair weld joint design. This supplement provides guidelines for weld repair options and post repair inspection using a well-engineered approach for CSEF steels. The user is cautioned to seek technical guidance for welding and selection of heat treating requirements.

Prior to using this guideline an engineering evaluation shall be performed to determine the scope of the repair and impact to safety prior to returning the pressure-retaining item to service for a specified period of time, based on approval by the Inspector, and when required the Jurisdiction. The organization performing the engineering evaluation shall have demonstrated proficiency and technical expertise with Grade 91 CSEF steels.

S11.2 WELD REPAIR OF GRADE 91 STEEL

S11.2.1 Weld Repair Options

(1) 9Cr-1Mo-VNbN Filler Metal (i.e. matching to Grade 91) + Controlled Fill + Low PWHT (Minimum temperature is 1250°F, 675°C). Acceptable filler materials are referenced in Table 1. The minimum time and maximum heat treatment temperature shall be in accordance with the original code of construction. For reference, where the Ni+Mn content of the filler metal *is not known*, the maximum PWHT temperature shall be 1425°F (775°C). As general best practice, this maximum shall be enforced to avoid over-tempering or exceeding the absolute maximum PWHT temperature. PWHT hold times at temperature shall be as follows;

- a. Minimum holding time at PWHT temperature is specified as 1 hour per 1.0 inch (25 mm) of thickness, 30 minute minimum provided the component < 0.5 inches (12.5 mm) in thickness;
- b. Minimum holding time at PWHT temperature is specified as 5 hours plus 15 minutes for each additional 1.0 inch (25 mm) over 5.0 inches (125 mm);

(2) 9Cr-1Mo Filler Metal + Controlled Fill and No PWHT. Acceptable filler materials are detailed in Table 1.

(3) Ni-base Filler Metal + Controlled Fill and No PWHT. Acceptable nickel base consumables include selected ASME F No. 43 filler metals as detailed in Table 1.

Table 11-1. Alternative Weld Repair Methods, Filler Metals and Welding Processes for Grade 91 Steel.

Acceptable Weld Repair Method		Welding Process and Filler Metal AWS Classification
Filler Metal	Welding Procedure	
Matching (9Cr-1Mo-VNbN)	Controlled Fill + Low PWHT	<ul style="list-style-type: none"> • SMAW – E9015-B9, E9016-B9, E9018-B9 or E9015-B91^A, E9016-B91^A or E9018-B91^A • FCAW – E91T1-B9 or E91T1-B91^A • GTAW – ER90S-B9 or ER90S-B91^A

9Cr-1Mo	Controlled Fill	<ul style="list-style-type: none"> • SMAW – E8015-B8, E8016-B8 or E8018-B8 • FCAW – E81T1-B8 • GTAW – ER80S-B8
Ni-base	Controlled Fill	<ul style="list-style-type: none"> • SMAW – EPRI P87^B, ENiCrFe-2, ENiCrFe-3 • FCAW – None available • GTAW – EPRI P87^C, ERNiCr-3

^A –B91 AWS classification is pending for the various Grade 91 filler metal product forms (currently –B9)

^B Incorporated by ASME B&PV Code as Code Case 2734 for classification as an F No. 43 filler material

^C Incorporated by ASME B&PV Code as Code Case 2733 for classification as an F No. 43 filler material

S11.3 Application of Controlled Fill Welding Procedure

(a) The minimum preheat for the repair procedure shall be 300 °F (150 °C). The preheat temperature shall be checked to ensure the minimum preheat temperature is maintained during all welding and until welding is completed. The maximum interpass temperature shall be 550 °F (290 °C). At the completion of welding, a post weld hydrogen bake-out is not required nor prohibited.

(b) In general, to control heat input, it is recommended to weld the repair groove using a “controlled fill” technique. In this technique, the first layer in contact with the repair groove can be identical or smaller in diameter than the fill passes.

(c) Figures 11-1 through 11-4 illustrate the various types of recommended weld joint details using the controlled fill technique for full or partial penetration weld repairs.

(d) The bead-to-bead overlap shall be ~50% or greater. The fill passes shall be deposited working from the bevel of the machined excavation towards the center of the excavation with a minimum overlap of 25% and ideally 50%. As a rule of thumb, if the welder aims for the toe of the previously deposited weld bead, an overlap of at least 40% will be achieved.

(e) When the SMAW process is specified with ferrous filler metals, the fill passes are restricted to a maximum diameter of 1/8 in. (3.2 mm). When the SMAW process is specified with nickel-base filler metals, the fill passes in immediate contact with the excavation shall not exceed a diameter of 1/8” (3.2 mm), and for the remaining fill passes to restore the excavated material an increase in the electrode diameter to 5/32 in. (4.0 mm) is permitted. When the GTAW process is specified, any limits for filler metal size shall be reflected in the qualified PQR and WPS.

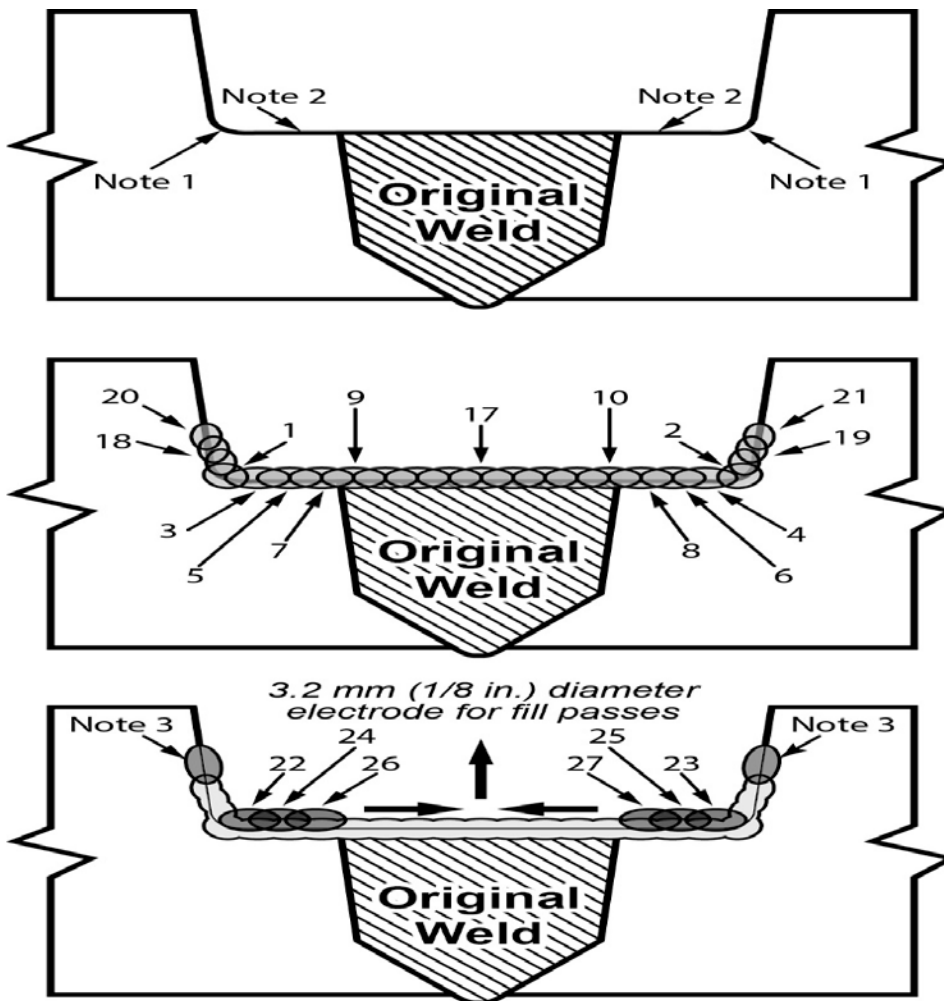


Figure 11-1. Schematic of the Controlled Fill Welding Procedure for Grade 91 Steel for a Partial Penetration Weld Repair .

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

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

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

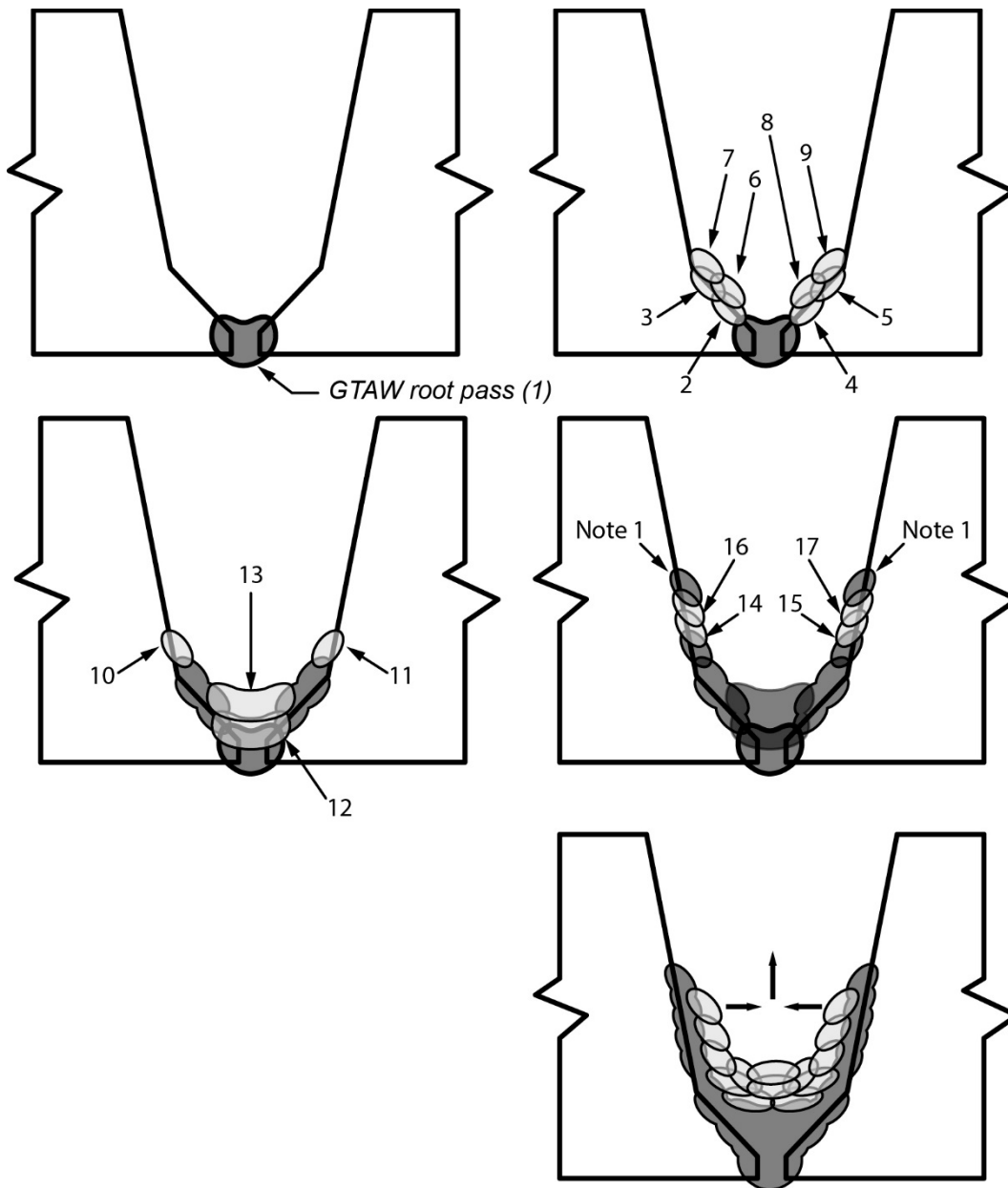


Figure 11-2. Schematic of the Controlled Fill Welding Procedure for Grade 91 Steel for a Full Penetration Weld Repair Using a Compound Bevel.
Note 1 – Where the excavation may pose challenges with electrode access, it is recommended that the fill passes in immediate contact with the machined excavation be restricted in height as the weld repair is performed.

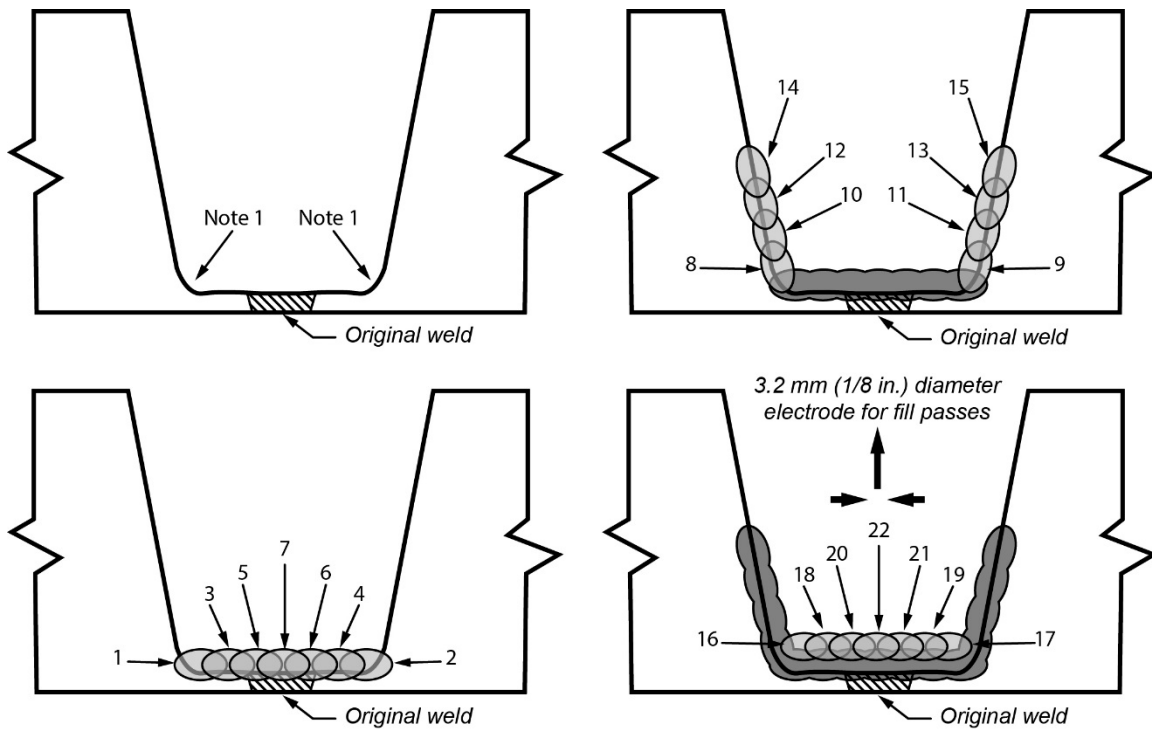


Figure 11-3. Schematic of the Controlled Fill Welding Procedure for Grade 91 Steel for Full Penetration Weld Repair Using a Land.

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

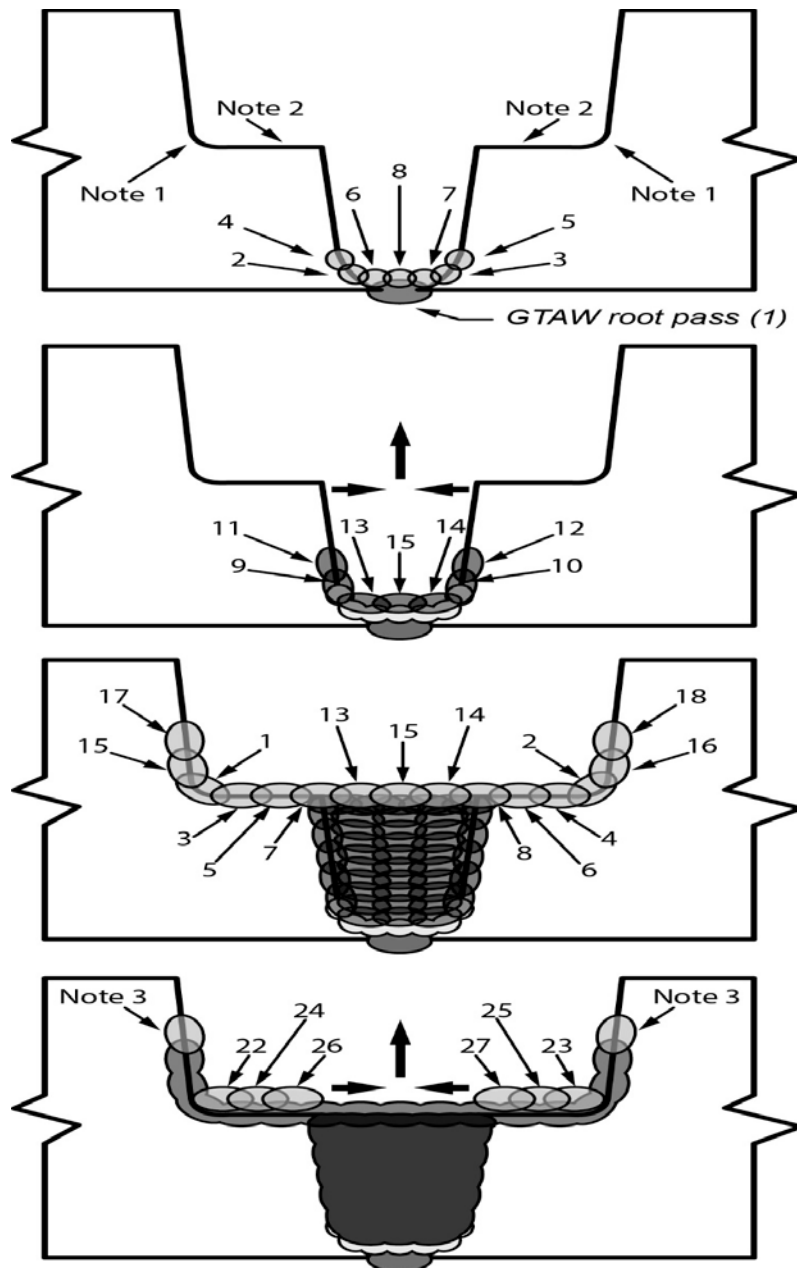


Figure 11-4. Schematic of the Controlled Fill Welding Procedure for Grade 91 Steel for a Full Penetration Weld repair Using a Step Weld Preparation.
Note 1 – The excavation shall have rounded corners to prevent lack of fusion defects. In these locations it is recommended to use a smaller diameter electrode (such as 3/32 in., 2.4 mm) to ensure acceptable fusion.
Note 2 – The repair cavity width shall extend at least 0.40 in. (10 mm) beyond the fusion line of the original weld
Note 3 – Where the excavation may pose challenges with electrode access, it is recommended that the fill passes in immediate contact with the machined excavation be restricted in height as the weld repair is performed.

S11.4 Qualification of Controlled Fill Welding Procedure

- (a) The test material for the welding procedure qualification shall be P-No 15E, Group 1, Grade 91.
- (b) Qualification thickness for the test plates and repair groove depths shall be in accordance with ASME Section IX.
- (c) The Welding Procedure Specification (WPS) shall be qualified in accordance with requirements of ASME Section IX, and using the essential welding variables and bead placement technique for the repair. If qualifying the WPS with PWHT, the PWHT is to be low temperature PWHT, i.e., a minimum temperature of 1250 deg F (675 deg C) and a maximum temperature of 1445 deg F (785 deg C).
- (d) For qualification of weld repair procedures using 9Cr-1Mo filler metal and in the as-welded condition, the requirements for the bend test shall be performed using a bend radius which achieves a minimum of 14% elongation in the outer fibers.

S11.5 POST REPAIR INSPECTION

- (a) After the completion of weld repairs to CSEF steels, post inspection requirements shall be developed and implemented based on acceptance from the Inspector, and if applicable, the Jurisdiction.
- (b) Post-repair inspection intervals and methods of examination shall be implemented to ensure safe operation and margin to locate and monitor defect growth in the weld repair area. The selected non-destructive examination method shall provide meaningful results and shall follow NBIC Part 3, Section 4..
- (c) Post repair inspection shall be on-going until the component reaches end of life or is replaced. A recommended re-inspection interval is every other planned major outage or six years, whichever is less. The Owner/User may revise the re-inspection interval based on inspection results from previous inspections.

For NBIC Committee use only

Action Item Request Form

CODE REVISIONS OR ADDITIONS

Existing Text: Part 3, Table 1.6.1, c)

Form "R" Reports, Records, or Documents	Instructions	Minimum Retention Period
c) Continuity records for a welder, welding operator, bonder, or cementing technician.	Minimally, continuity records for a welder, bonder, or cementing technician within the Certificate Holder's quality system shall be described and established at the time of the applicant's initial certificate review and demonstrated at each triennial review required thereafter.	As applicable to the scope of work identified on the <i>Certificate of Authorization</i> , the continuity records are subject to review during each National Board triennial certificate review.

Add the following sentence to the text regarding "Minimum retention Period".

Continuity records established prior to the latest National Board triennial certificate review need not be retained by the Certificate Holder.

Statement of Need

After discussions with a number of review team leaders, it's my understanding that, as a "rule of thumb", certificate review team leaders do not review continuity records established prior to the last triennial review. However, because there is no established retention period for continuity records, the Certificate Holder may be expected to retain continuity records from the date of initial qualification onward. This can be as long as 10 to 20 years, or longer. This is an unnecessary burden on the Certificate Holders.

Background Information

The burden of records retention varies amongst the various Certificate Holders. For example, it may be of little or no burden for a Certificate Holder that employs a limited number of welders or bonders on a continuous basis, but for a Certificate Holder that employs hundreds, perhaps thousands, of welders or bonders for short periods of time, such as needed for site repairs and alterations, record retention becomes quite burdensome. Is verification of continuity maintenance dating back longer than three years needed to assure safety? I don't believe so. The NBIC has built-in safeguards when a welder's or bonder's skill comes into question. These safeguards are provided in Part 3, Section I, paragraph 2.2.6.b and 2.2.6.1.c, Section 6, S4.10.5.b, S6.8.6.b, and S7.12.6.b. These paragraphs require qualifications to be revoked when there is specific reason to question the person's ability to meet the specification requirements.

INTERPRETATION 98-15

Subject: RC-3022 & RC-3030(h) Pressure Testing Requirements Related to Re-rating Activities

1995 Edition with the 1996 Addendum

Question 1: If calculations and current thickness measurements indicate that a pressure retaining item may be altered by re-rating only (no physical work being done), may the original pressure test as recorded on the Manufacturer's Data Report be used to satisfy RC-3022(d), if the pressure test is at least equal to the calculated test pressure required to verify the integrity of said alteration, subject to the approval of the Inspector and the requirements of the jurisdiction?

Reply 1: Yes.

Question 2: If the maximum allowable working pressure (MAWP) of a pressure-retaining item must be reduced, due to wall thinning below the minimum wall thickness required to contain the MAWP stated on the manufacturer's data report and on the ASME stamped nameplate, but the maximum allowable temperature is increased, is it the intent of the NBIC that this be considered a re-rate?

Reply 2: Yes. Any increase in pressure or temperature is considered a re-rate in accordance with RC-3022.

Question 3: If the maximum allowable working pressure (MAWP) of a pressure-retaining item must be reduced, due to wall thinning below the minimum wall thickness required to contain the MAWP stated on the manufacturer's data report and on the ASME stamped nameplate, but the maximum allowable temperature is increased, is it the intent of the NBIC that this is, in effect, a derate and outside the scope of the NBIC?

Reply 3: No. Any increase in pressure or temperature is considered a re-rate in accordance with RC-3022.

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