Date Distributed: October 15, 2020

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD SUBCOMMITTEE REPAIRS & ALTERATIONS

AGENDA

Meeting of October 20th, 2020
WebEx Online Meeting

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

1. **Call to Order (11 a.m. Eastern Time)**

2. **Introduction of Members and Visitors**

3. **Adoption of the Agenda**

4. **Public Review Comments**

Item Number: PR20-0301	**NBIC Location: Part 3, New Supplement 9, Table S9.3**	**Attachment Page 2**
Submitted by: Alexander Garbolevsky, Hartford Steam Boiler **Related NBIC Action Item:** Item 18-66 (Moving R Forms to New Supplement) **Comment:** In Line 12 of Table S9.3, no comma is needed in the expression “design, registration number”.		

Item Number: PR20-0302	**NBIC Location: Part 3, S4.19.2**	**Attachment Page 4**
Submitted by: Alexander Garbolevsky, Hartford Steam Boiler **Related NBIC Action Item:** Item NB16-1403 (Add information on repair of high pressure vessels) **Comment:** No SI units are shown in Part 3, S4.19.2 and the abbreviation “MAE” is not defined.** **Note that “MAE” is found in S4.19.7, not S4.19.2.		

Item Number: PR20-0303	**NBIC Location: Part 3, 2.2.1**	**Attachment Page 8**
Submitted by: Alexander Garbolevsky, Hartford Steam Boiler **Related NBIC Action Item:** Item 20-28 (Qualification of welding procedures by multiple organizations) **Comment:** Part 3, 2.2.1 refers to QG-106.4, which is not a reference in ASME Section IX, 2019 Edition. Also, any reference in Part PG is general, so, if applicable, it could apply to brazing and fusing as well.		

Item Number: PR20-0304	**NBIC Location: Part 3**	**Attachment Page 10**
Submitted by: Robert Price **Related NBIC Action Item:** None **Comment:** The comment’s focus is on the lack of examples of mechanical repairs in NBIC Part 3. See Attachment Page 10 for the full comment.		

Item Number: PR20-0305	NBIC Location: Part 3	Attachment Page 11
Submitted by: Robert Price **Related NBIC Action Item:** Item 18-66 (Moving R Forms to New Supplement) **Comment:** This comment focuses on changes to the R-1 form to prevent mistakes made by small R certificate holders whose primary work is boiler tube repairs. See Attachment Page 11 for the full comment.		

Item Number: PR20-0306	NBIC Location: Part 3, 3.3.6.2	Attachment Page 16
Submitted by: Nathan Carter, Hartford Steam Boiler **Related NBIC Action Item:** Item NB15-1405 (Impact testing of P-11B Material) **Comment:** See Attachment Pages 16 and 17 for full comment.		

5. Future Meetings

January 11-14, 2021 – TBD
July 12-15, 2021 – TBD

6. Adjournment

Respectfully submitted,

Jonathan Ellis

Jonathan Ellis
NBIC Secretary

Contents

Public Review Comment Resolutions

1. **Accepted, changes are incorporated** – Accept/agree with the comment. Required non substantive changes are made to the draft addendum to address the comment and no substantive changes have been made.

2. **Accept in principle, new business item opened -** Accept/agree with the comment and will require additional work for future changes. (However current proposal is not technically wrong and provides guidance.)Requires a new action item for tracking for substantive changes.

3. **Accepted in principle and the item is being returned to the committee for action.** (Proposal may contain technical or other incorrect information.)

4. **Rejected for the following reason** – Complete comment is rejected. Reason must be given.

Substantive Change; A substantive change in a proposed American National Standard is one that directly and materially affects the use of the standard. Examples of substantive changes are below:

- "shall" to "should" or "should" to "shall";
- Additional, deletion or revision of requirements, regardless of the number of changes;
- Addition of mandatory compliance with reference standards.

Unresolved; Either (a) a negative vote submitted by a consensus body member or (b) written comments, submitted by a person during public review expressing disagreement with some or all of the proposed standard, that have not been satisfied and/or withdrawn after having been addressed according to the developer's approved procedures.

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Comments Must be Received No Later Than: October 12, 2020

Instructions: If unable to submit electronically, please print this form and fax or mail. Print or type clearly.

Date: September 18, 2020

Commenter Name: Alexander Garbolevsky

Commenter Address: HSB, One State Street, 7th Floor
Hartford, CT 06103

Commenter Phone: (774) 249-2803

Commenter Fax:

Commenter Email: alex_garbolevsky@hsb.com

Section/Subsection Referenced: Part 3, Table S9.3 Item (12)

Comment/Recommendation: *Proposed Solution:* □ New Text ■ Revise Text □ Delete Text

No comma is needed in the expression "design, registration number".

Source: □ Own Experience/Idea □ Other Source/Article/Code/Standard

Submit Form To: Jonathan Ellis, NBIC Secretary, The National Board of Boiler & Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, email: NBICSecretary@nationalboard.org

NB Use Only

Commenter No. Issued:

Comment No. Issued: PR20-0301

Project Committee Referred To: NBIC Subcommittee R&A

TABLE S9.3

GUIDE FOR COMPLETING FORM R-2, REPORT OF ALTERATION, NB-226

Reference to Circled Numbers in the Form	Description
(1)	Initials of the National Board "R" Certificate of Authorization authorized representative who registers the Form R-2.
(2)	Initials of the Inspector who certified the completed Form R-2 for registration.
(3)	When registering a Form R-2 with the National Board, this line is solely designated for a unique sequential number assigned by the "R" Certificate Holder. As described in NBIC Part 3, Paragraph 5.6, a log shall be maintained identifying unique and sequentially numbered Form "R" reports that are registered with the National Board. For rerating only, the Design Organization registers the Form R-2.
(4)	If applicable, document the unique purchase order, job, or tracking number assigned by the organization performing the work.
(5)	The name and address of the National Board "R" Certificate of Authorization holder performing the design as it appears on the "Certificate of Authorization".
(6)	The name and address of the National Board "R" Certificate of Authorization holder performing the construction activity as it appears on the "Certificate of Authorization."
(7)	Name and address of the owner of the pressure-retaining item.
(8)	Name and address of the plant or facility where the pressure-retaining item is installed.
(9)	Description of the pressure-retaining item, such as boiler or pressure vessel, or piping. Include the applicable unit identification.
(10)	Name of the original manufacturer of the pressure-retaining item. If the original manufacturer is unknown, indicate by, "unknown."
(11)	Document the serial number of the pressure-retaining item if assigned by the original manufacturer. If there is no serial number assigned or it is unknown, indicate "unknown."
(12)	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."
(13)	Indicate the jurisdiction number assigned to the pressure retaining item, if available.
(14)	Indicate any other unique identifying nomenclature assigned to the

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Hartford, CT 06103

Commenter Phone: (774) 249-2803

Commenter Fax:

Commenter Email: alex_garbolevsky@hsb.com

Section/Subsection Referenced: Part 3, S4.19.2

Comment/Recommendation: *Proposed Solution:* ■ New Text ■ Revise Text □ Delete Text

Item 16-1403, Part 3, S4.19.2 - no SI units are shown and the abbreviation "MAE" is not defined.

Source: ■ Own Experience/Idea □ Other Source/Article/Code/Standard

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Comment No. Issued: PR20-0302

Project Committee Referred To: NBIC Subcommittee R&A

	ASME Code Section X, Class 1 vessels that have an MAWP equal to or greater than 1500 psi (10.34 MPa) and Class III vessels in accordance with the requirements of S4.19.~~200 psig (1.38 MPa)~~
Item 17-137 Part 3, S4.18.2.1 b) 2) d. 2. & 4.	d. As a last resort, if the previous procedure does not provide an adequate bond, the permeated laminate must be handled differently using the following procedure: 1. Hot water wash the equipment. 2. Abrasive blast ~~with #3 sand, or equal~~ to achieve a 0.003 to 0.005 in. (0.08 to 0.12 mm) anchor pattern, and allow to completely dry. 3. Prime with the recommended primer, an area 12 in. (305 mm) x 12 in. (305 mm) and apply a test patch. 4. Prime a second spot 12 in. (305 mm) x 12 in. (305 mm) and prime with a recommended ~~epoxy resin~~ alternate primer. 5. Allow this primer to cure.
Item 17-137 Part 3, S4.18.2.2 a) 2)	2) Note that any cracks, delaminations, or permeated surfaces must be removed. If the damage is deeper than the corrosion barrier and the material removed reaches the structural laminate, the vessel is not repairable. An adequate size abrasive or proper sanding disc must be used to obtain a ~~0.003 to 0.005~~ 0.002 to 0.003 in (0.05 to 0.08 mm) anchor pattern to the area that requires the repair.
Item NB16-1403 Part 3, S4.19	**S4.19 REPAIR OF HIGH PRESSURE FILAMENT WOUND VESSELS** **S4.19.1 Scope** Types of damage that are addressed in this section include abrasion, cuts and scratches, impact, chemical, fire and heat, and weathering. **S4.19.2 Level of damage** – Level 1 damage, up to 0.010 inch, is repairable any time – Level 2 damage, defined by the manufacturer (or up to 0.050 if not defined), is repairable with the manufacturer's concurrence – Level 3 damage, defined by the manufacturer (or 0.050 or greater if not defined), is not repairable Softening of the resin due to chemical attack, or charring due to exposure to fire, shall be defined as Level 3 damage. The manufacturer's guidance for assessing damage depth and levels shall be followed if it conflicts with general guidelines in this document. **Table S4.19.2-1 Damage Levels and Assessment**

Type of damage	Definition				Comment
		Level 1 — accept	Level 2	Level 3 — reject	
Cuts/scratches	A sharp impression where material has been removed or redistributed	When depth is less than 0.010 in	Depth from 0.010 in to the limit defined by the manufacturer, or 0.050 if not defined.	Greater than the limit defined by the manufacturer, or greater than 0.050 if not defined	
Abrasion	An area that is scuffed or worn thinner by rubbing or scraping	When depth is less than 0.010 in	Depth from 0.010 in to the limit defined by the manufacturer, or 0.050 if not defined.	Greater than the limit defined by the manufacturer, or greater than 0.050 if not defined	
Charring/soot	Blackening or browning of an area, burning of an area	Soot only, which washes off	Minor discolouration; manufacturer's recommendation	Charring	
Chemical attack, including stress corrosion cracking	Vessel is subjected to a chemical that softens or dissolves the composite	Residue may be cleaned off, no evidence of softening or dissolving.	Permanent discoloration.	Softening or dissolving of the material, cracking of the composite due to stress and chemical exposure	
Impact	Composite material was struck or hit; the resin has a frosted or smashed appearance	Damaged area is less than 0.20 in^2 and no other damage is apparent	Damage is uncertain, requiring the manufacturer's advice	Permanent deformation of cylinder or liner, evidence of underlying delamination	
Weathering	Composite affected by UV exposure and general weather	Minor gloss loss or chalking, only non-structural materials affected.	Structural laminate affected to a level less than defined by the manufacturer, or 0.050 inch.	Structural laminate affected to a level greater than defined by the manufacturer, or 0.050 inch	

S4.19.3 Thickness considerations

Damage to a depth greater than 5% of the structural laminate thickness is not repairable, and the vessel shall be removed from service. Depth of damage does not include paint thickness, or material designated by the manufacturer as protective (non-structural) rather than structural.

S4.19.4 Impact damage considerations

Impact damage may result in rejection, without possibility of repair, regardless of the measurable depth due to risk of internal fracture or delamination. Impact damage may be characterized by noting permanent deformation, softness or deflection of the surface, or localized surface crazing.

	S4.19.5 Assessment of damage depth All loose fibers and affected resin shall be removed. This includes material that is softened by actions of chemicals or heat. Confirmation that the material remaining is sound shall be determined by a tap test, Barcol hardness measurement, and/or visual inspection. **S4.19.6 Repair procedure** a) Non-structural material, including paint, shall be removed from any area involved in the repair. b) Resin used in structural repairs shall be compatible with the resin used to fabricate the vessel. c) Cloth patches made of glass or carbon fiber may be used in the repair and to cover the repaired area. 1) Cloth patches shall extend at least 0.5 inches beyond the edge of the repair area, and subsequent layers shall extend at least 0.25 inch beyond the edge of the previous patch. 2) Total patch thickness shall not be more than 5% of the structural thickness of the original laminate. d) A layer of fiber wound continuously in the hoop direction may be applied over the repair. e) Non-structural material may be applied to the repaired area for protection if originally used in the vessel design. f) The repaired area may be covered with epoxy, polyurethane, or other compatible paint. g) The repaired area shall be cured at a temperature that will not degrade the resin in the vessel. It may be cured prior to applying any non-structural material or paint. h) The repair shall be confirmed by either: 1) A tap test or Barcol hardness measurement conducted on the structural material after cure and prior to applying any non-structural material or paint, or 2) A Modal Acoustic Emission test, in accordance with Part 2 S10.10, conducted after cure of the structural material i) A hydrostatic proof test shall be conducted following confirmation of the repair. **S4.19.7 Acceptance of the vessel for return to service** The repair shall meet the repair confirmation requirement (i.e. confirmation of soundness using the tap test or Barcol hardness measurement, or confirmation using MAE). There shall be no delamination of the repaired area resulting from a hydrostatic proof test in accordance with the Design Specification. A vessel that does not meet the requirements of the repair confirmation or hydrostatic proof test shall not be returned to service.
19-24 Part 3, S6.16.4	**S6.16.4 REGISTRATION OF FORM R-1 AND FORM R-2** a) Organizations performing repairs, alterations, or modifications required by this supplement shall register such repairs, alterations, or modifications with the National Board. b) The repair organization shall maintain a sequential Form "R" Log that shall identify the following:

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Commenter Address: HSB, One State Street, 7th Floor
Hartford, CT 06103

Commenter Phone: (774) 249-2803

Commenter Fax:

Commenter Email: alex_garbolevsky@hsb.com

Section/Subsection Referenced: Part 3, 2.2.1

Comment/Recommendation: *Proposed Solution:* ■ New Text ■ Revise Text □ Delete Text

Item 20-28, Part 3, 2.2.1 refers to QG-106.4, which is not a reference in ASME Section IX, 2019 Edition. Also, any reference in Part PG is general, so, if applicable, it could apply to brazing and fusing as well.

Source: □ Own Experience/Idea ■ Other Source/Article/Code/Standard ASME Sec IX, QG-106

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Commenter No. Issued:

Comment No. Issued: PR20-0303

Project Committee Referred To: NBIC Subcommittee R&A

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

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

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

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

Current Wording	Proposed Wording
2.2.1 PROCEDURE SPECIFICATIONS A procedure specification is a written document providing direction to the person applying the material joining process. Welding, brazing and fusing shall be performed in accordance with procedure specifications for welding (WPS), brazing (BPS), and fusing (FPS) qualified in accordance with the original code of construction or the construction standard or code selected. When this is not possible or practicable, the procedure specification may be qualified in accordance with ASME Section IX.	**2.2.1 PROCEDURE SPECIFICATIONS** A procedure specification is a written document providing direction to the person applying the material joining process. Welding, brazing and fusing shall be performed in accordance with procedure specifications for welding (WPS), brazing (BPS), and fusing (FPS) qualified in accordance with the original code of construction or the construction standard or code selected. When this is not possible or practicable, the procedure specification may be qualified in accordance with ASME Section IX. Welding procedures may be simultaneously qualified by more than one organization under the rules of ASME Section IX QG-106.4, provided that each organization accepts full responsibility for any such qualifications and complies with the other requirements of Section IX for documentation of welding records. The manufacturer's or assembler's written quality control program shall include requirements for addressing the rules of Section IX QG-106.4.

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Date: 10/01/2020

Commenter Name: Robert Price

Commenter Address: 243b Lincoln Ave.
Mt. Holly, NJ 08060

Commenter Phone: (60-9) 841-5093

Commenter Fax: N/A

Commenter Email: lindaroberp@msn.com

Section/Subsection Referenced: NBIC Part 3

Comment/Recommendation: *Proposed Solution:* □ New Text □ Revise Text □ Delete Text

The current revision to the draft 20121 NBIC does NOT include examples of a mechanical repairs. These examples would include the most common mechanical repair, tube replacement by rolling only we find with the small NB R Certificate holder. The other this is MISSED all the time when the threaded piping on a Section I boiler classified as P4b, Additional mechanical repairs would be mechanical installed safety vales, Section VIII heat exchanger tube replacement, non welded, and cast iron sections. There is an interpretation regarding cast iron that some customers put the requirement in their contracts. NB "R" certificate holder wished it became MANDATORY the NBIC would require cast iron section would be recorded on the R-1.

Source: ■ Own Experience/Idea □ Other Source/Article/Code/Standard

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Commenter No. Issued:

Comment No. Issued: PR20-0304

Project Committee Referred To: NBIC Subcommittee R&A

PR20-0305

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Date: 10/01/2020

Commenter Name: Robert Price

Commenter Address: 243 Lincoln Ave.,
Mt. Holly, NJ 08060

Commenter Phone: (609) 841-5093

Commenter Fax: N/A

Commenter Email: lindarobertp@msn.com

Section/Subsection Referenced: S9.2.2 R-1 form

Comment/Recommendation: *Proposed Solution:* ■ New Text ■ Revise Text □ Delete Text

The NBIC R-1 form requires the repair organization to record the method of repair as identified on line 7. The repair method is also required on line 8 that identifies the type of repair. Many repairs are mechanical repair such as tube replacements in Section I. IV fire tube boilers or VIII div. 1 heat exchangers. Also threaded piping replacement classified as P4b in ASME Section I is also a mechanical repair..
Attached is recommendations to correct the R-1 as a workable document that helps prevents common mistakes made by small R certificate holder whos primary work is boiler tube repairs..

Source: ■ Own Experience/Idea □ Other Source/Article/Code/Standard

Submit Form To: Jonathan Ellis, NBIC Secretary, The National Board of Boiler & Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, email: NBICSecretary@nationalboard.org

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Commenter No. Issued:

Comment No. Issued: PR20-0305

Project Committee Referred To: NBIC Subcommittee R&A

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

H STAMPED

NB-66, Rev. 16, (01/28/19)

FORM R-1 REPORT OF REPAIR

in accordance with provisions of the *National Board Inspection Code*

(Authorized Rep. initials)

(Inspectors initials)

N/A

(Form "R" Registration no.)

(P.O. no., job no., etc.)

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

(address)

2. OWNER: _____ (name)

(address)

3. LOCATION OF INSTALLATION: _____ (name)

(address)

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

5. IDENTIFYING NOS: _____ (mfg. serial no.) _____ (National Board no.) _____ (jurisdiction no.) _____ (other) _____ (year built)

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

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

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

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

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

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

9. REPLACEMENT PARTS: (Attached are Manufacturer's Partial Data Reports or Form R-3's properly completed for the following items of this report):
(name of part, item number, data report type or Certificate of Compliance, mfg's. name and identifying stamp)

10. REMARKS: ROUTINE REPAIR ☐ REPAIR ☐ MECHANICAL ☐

	1) Form number assigned ~~for Form R~~to the "R" Form; 2) Identify if the activity was a repair, alteration, or modification; 3) When the repair, alteration, or modification was completed, and 4) Date sent to the National Board.
Item 18-66 Part 3, New Supplement 9	SUPPLEMENT 9 REPAIR AND ALTERATION FORMS AND INSTRUCTIONS FOR COMPLETING FORMS S9.1 SCOPE a) This supplement provides requirements and guidelines for completing the following National Board Forms 1) R-1 (Report of Repair, form NB-66) 2) R-2 (Report of Alteration, form NB-229) 3) R-3 (Report of Parts Fabricated by Welding, form NB-230) 4) R-4 (Report Supplement Sheet, form NB-231) 5) NR-1 (Report of Repair/Replacement Activities for Nuclear Facilities, form NB-81) 6) NVR-1 (Report of Repair/Replacement Activities for Nuclear Pressure Relief Devices, form NB-160). b) Immediately following each of the forms within this supplement is a guide for completing that form. The forms may be used for documenting specific requirements as indicated on the top of each form. The explanations included in the guides are keyed to the forms in the following manner: 1) Circled numbers on each of the forms refer to the items listed on the applicable guide. The parenthesized numbers in the guides correspond to circled numbers on the forms. 2) Numbers without circles appearing in the guides identify specific line or item numbers of the forms. c) When computer generated, the format of the form shall replicate the type and relative location of the information depicted on the applicable form for the specific requirements as indicated on the top of each form. Note that a fillable version of all forms is available on the National Board website. S9.2 FORM R-1, REPORT OF REPAIR, NB-66 FIGURE S9.2.1 FORM R-1, PAGE 1 OF 2

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NB-66, Rev. 16, (01/28/19)

FORM R-1 REPORT OF REPAIR

in accordance with provisions of the *National Board Inspection Code*

(1) _____ (Authorized Rep. initials)

(2) _____ (Inspectors initials)

(3) _____ (Form "R" Registration no.)

(4) _____ (P.O. no., job no., etc.)

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

_____ (address)

2. OWNER: (6) _____ (name)

_____ (address)

3. LOCATION OF INSTALLATION: (7) _____ (name)

_____ (address)

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

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

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

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

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

7. REPAIR TYPE (18) ☐ welded ☐ graphite pressure equipment ☐ FRP pressure equipment ☐ DOT

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

(19) _____

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

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

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

(23) _____

10. REMARKS: (24) _____

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

Page 1 of 2

FIGURE S9.2.2

FORM R-1, PAGE 2 OF 2

(25) _____
(Form "R" Registration no.)

(26) _____
(P.O. no., job no., etc.)

CERTIFICATE OF COMPLIANCE

I, (27) _____, certify that to the best of my knowledge and belief the statements made in this report are correct and that all material, construction, and workmanship on this Repair conforms to the *National Board Inspection Code*. National Board "**R**" *Certificate of Authorization* No. (28) _____ Expiration date: (29) _____

Repair Organization: (30) _____

Signed: (31) _____
(authorized representative)

Date: (32) _____

CERTIFICATE OF INSPECTION

I, (33) _____, holding a valid commission issued by The National Board of Boiler and Pressure Vessel Inspectors and certificate of competency, where required, issued by the Jurisdiction of (34) _____ and employed by (35) _____ of (36) _____ have inspected the work described in this report on (37) _____, _____ and state that to the best of my knowledge and belief, this work complies with the applicable requirements of the *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.

Commissions: (38) _____
(National Board and Jurisdiction no. including endorsement)

Signed: (39) _____
(Inspector)

Date: (40) _____

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Section/Subsection Referenced: NBIC Part 3, 3.3.6

Comment/Recommendation: *Proposed Solution:* □ New Text ■ Revise Text □ Delete Text

1. In 3.3.6.2, how will a R-Certificate holder know what the heat-treated condition of the material being repaired is? They are not necessarily the OEM, may not have the MDR, and also may not know the thermal history of subsequent repairs. Is the intent for each repair that samples be removed from the vessel for analysis to approximate the thermal condition to then replicate on the PQR test coupon material?
2. The heat-treated condition rule stated in 3.3.6.2 applies to ALL Materials. This is more stringent than VIII-1 and VIII-2 have for new construction as the heat-treated condition rules (UG-84(h)(2)(-b)) applies only to carbon and low alloy steels. The NBIC rule will now mandate this for UHA, UNF, UHT, etc in addition to UCS materials. Is that really the intent?
[see attachment for additional comments]

Source: □ Own Experience/Idea ■ Other Source/Article/Code/Standard Section VIII Div 1

Submit Form To: Jonathan Ellis, NBIC Secretary, The National Board of Boiler & Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, email: NBICSecretary@nationalboard.org

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Commenter No. Issued:

Comment No. Issued: PR20-0306

Project Committee Referred To: NBIC Subcommittee R&A

Additional Comments

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2. The heat-treated condition rule stated in 3.3.6.2 applies to ALL Materials. This is more stringent than VIII-1 and VIII-2 have for new construction as the heat-treated condition rules (UG-84(h)(2)(-b)) applies only to carbon and low alloy steels. The NBIC rule will now mandate this for UHA, UNF, UHT, etc in addition to UCS materials. Is that really the intent?
    a. 3.3.6.2 a): Says that in the event the "notch toughness" of the material being repaired is unknown. Should this instead say "heat-treated condition"? If it is meant to say "notch toughness" what is this trying to achieve? I assume this is to have some idea of in-lieu of using "production impact test plates" that the existing vessel material has sufficient toughness to reenter service after the repair. It says the base metal material or from another acceptable source may be used for the base metal notch toughness <u>when qualifying the WPS.</u> I am not sure what this means. The way it is written, it implies that base metal impact test specimens be removed and tested along with the HAZ and weld metal when qualifying the WPS. The effectively would possibly require a new PQR each time there is a job to use the actual material from the vessel or a substitute (or until enough substitutes are established with new base metal tests conducted when qualifying the WPS).
    b. 3.3.6.2 a) makes reference to NBIC Part 3, 2.5.3.2 h). A problem exists in that this paragraph states to determine the CVN test temperature in accordance with Part 3, 2.5.3.2 d). This subparagraph does not speak to establishing a CVN test temperature (only preheat and interpass). A request for a new record was submitted to address this issue in Welding Method #2. Publishing paragraph 3.3.6 as written will lead to confusion in determining the CVN test temperature.
        i. The last sentence in referenced 2.5.3.2 h) states no exemption from impact testing. This conflicts with 3.3.6.1, which may result in Code users believing that CVN testing is always required during vessel repairs.

        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;

    c. 3.3.6.2 b): Requires as closely as possible the same "heat-treated condition". Without performing analysis when approaching each repair, determining the actual heat-treated condition is just a guess.

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

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

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

INSERT NEW PARAGRAPHS:

3.3.6 Pressure Vessel Impact Testing

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

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

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

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

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