



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

# **NATIONAL BOARD SUBCOMMITTEE REPAIRS AND ALTERATIONS**

## **MINUTES**

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Meeting of January 15<sup>th</sup>, 2020  
San Diego, CA

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

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## **1. Call to Order**

The meeting was called to order at 8:06 AM by Acting Chair Kathy Moore.

## **2. Introduction of Members and Visitors**

Introductions took place amongst all members and visitors, and an attendance sheet was circulated ([Attachment 1](#)).

Mr. Eric Cutlip was announced as an alternate for Mr. Ray Miletti on the SubCommittee.

With the attached roster and the above noted individual, a quorum was established. There was a motion to approve the roster as published. The motion was unanimously approved.

## **3. Announcements**

Secretary Hellman announced the reception for all committee members and visitors on Wednesday evening and the breakfast and lunch on Thursday.

## **4. Adoption of the Agenda**

Mr. Hellman listed the following changes to the Agenda:

Add Interp. Item 20-1, 20-2, and 20-3

Added Action Item 20-4

Updated Action Item 19-60 scope, (General Description and Explanation of Need)

A motion was made to adopt the Agenda as amended and was unanimously approved.

## **5. Approval of the Minutes of the July 17<sup>th</sup>, 2019 Meeting**

There was a motion to approve the Minutes of July 17, 2019 as published. The motion was seconded and approved.

## **6. Review of Rosters**

Ms. Moore announced that Jim Pillow has retired 12/19/2019, and Mr. Joel Amato has stepped down from the SC

### **a. Membership Nominations**

- i.** Mr. Tracy Rudy was nominated and unanimously approved by the Subcommittee to become a member of Task Group Graphite.

### **b. Membership Reappointments**

The following members were unanimously approved to be reappointed to the referenced Task Group, Subgroup, or Subcommittee:

- i.** Mr. Brian Morelock – Subcommittee R&A
- ii.** Mr. Walter Sperko – Subgroup R&A
- iii.** Mr. Craig Hopkins – Subgroup R&A
- iv.** Mr. Rick Sturm – Subgroup R&A
- v.** Mr. Marty Toth – Subgroup R&A
- vi.** Mr. Chris Cary – Task Group Graphite

## 7. Interpretations

Item Number: 19-5	NBIC Location: Part 3, 3.2.6	Attachment 2
<p><b>General Description:</b> Reference to Other Codes and Standards</p> <p><b>Subgroup:</b> Repairs and Alterations <b>Task Group:</b> B. Morelock – PM</p> <p><b>July '19 Meeting Action:</b> Mr. Rick Sturm presented. Mr. Paul Edwards commented that Q1 was consulting and focus should only be on Q2. After much discussion, the proposal was revised, motioned, seconded, and unanimously approved.</p> <p><b>Update:</b> A proposal for this item was balloted to Main Committee but failed to pass.</p> <p><b>Meeting Action:</b> Mr. Morelock presented. Paul Edwards commented that the LB response regarding “Consulting” should be under the line on the response to the inquirer. <b>A motion to accept the response as amended was made and unanimously approved.</b></p>		

Item Number: 19-10	NBIC Location: Part 3, Introduction, paragraph on Interpretations	Attachment 3
<p><b>General Description:</b> Allow interpretations to be used in any edition, provide the same wording</p> <p><b>Subgroup:</b> Repairs and Alterations <b>Task Group:</b> K. Moore – PM</p> <p><b>Explanation of Need:</b> NBIC currently limits each interpretation to the edition it was issued for. However often time the words in question do not change from one edition to another. At present a new interpretation would be needed for each edition of the NBIC to address the same issues, this is a delay to field work and a drain on NBIC committee time.</p> <p><b>Meeting Action:</b> Mr. Paul Edwards presented a revised proposal referencing Section 8.1b). A motion to accepted the proposal as amended was seconded and unanimously approved.</p>		

<b>Item Number: 19-25</b>	<b>NBIC Location: Part 3, 4.4.2 c)</b>	<a href="#">Attachment 4</a>
<p><b>General Description:</b> NDE methods to do in lieu of Hydro test</p> <p><b>Subgroup:</b> Repairs and Alterations  <b>Task Group:</b> J. Siefert – PM</p> <p><b>Explanation of Need:</b> For ASME BPV Section VIII Division 2 Vessel is under Alteration with Re-rate of lowering MAWP &amp; increasing of Design Temperature &amp; there is no physical alteration in the Vessel but only change is in the Alteration design report because of different design stress intensity value at higher design temperature.</p> <p><b>Update:</b> A proposal for this item was balloted to Main Committee but failed to pass.</p> <p><b>Meeting Action:</b> Mr. J. Siefert presented, and after discussion, the proposal was motioned, seconded, and unanimously approved as amended.</p>		

<b>Item Number: 19-26</b>	<b>NBIC Location: Part 3, 3.3.2</b>	<a href="#">Attachment 5</a>
<p><b>General Description:</b> Clarification on welding repairs on appendages</p> <p><b>Subgroup:</b> Repairs and Alterations  <b>Task Group:</b> P. Shanks – PM</p> <p><b>Explanation of Need:</b> The original submitter of this item will sometimes need to perform a welding repair on an appendage (not on the tank itself) in order for the complete process of refurbishment to be done for their customers' expectations. There appears to be no direct reference to these types of minor welding repairs for the refurbishment process in the NBIC code.</p> <p><b>Update:</b> A proposal for this item was balloted to Main Committee but failed to pass.</p> <p><b>Meeting Action:</b> Mr. P. Shanks presented a revised proposal addressing MC LB comments. A motion to accept the amended proposal was made, seconded, and approved. (2 Negatives – M. Toth, P. Becker.)</p>		

**Item Number: 19-34**

**NBIC Location: Part 3, 3.2.2 e)**

**Attachment 6**

**General Description:** Is it the intent of Part 3, 3.2.2 e) that the reference to the original code of construction is for determining the hydrostatic test pressure?

**Subgroup:** Repairs and Alterations

**Task Group:** P. Edwards – PM

**Explanation of Need:** NBIC Part 3 Section 3 paragraph 3.2.2 e) (shown below) states that replacement parts shall receive a pressure test as required by the original code of construction. The original submitter is concerned that this clause is not being interpreted consistently by all users of the NBIC. The words in question are "...as required by the original code of construction." ASME issued interpretation I-16-1 (shown below) and revised PW-54 to clarify that Section I does not contain requirements for the hydrostatic testing of replacement parts provided for an existing unit. Based on this, the words "... as required by the original code of construction." Could be interpreted to mean that pressure testing of the parts is not required because Section I does not require testing of replacement parts. The submitter does not think that was the Committee's intent when clause e) was added to 3.2.2. Linking the words "original code of construction" to the test pressure would eliminate the potential interpretation that testing is only required when the original code of construction specifically requires testing of replacement parts.

**Update:** The proposal was withdrawn at the July Main Committee meeting to wait until a code revision was opened to address the question.

**Meeting Action:** Mr. P. Edwards presented this interpretation was an "intent interpretation" used to address the revision to the NBIC handled under Action Item 19-59. A motion was made, seconded, and unanimously approved.

**Item Number: 19-36**

**NBIC Location: Part 3, 3.3.2 &  
3.3.5**

**[Attachment 7](#)**

**General Description:** Routine Repairs of VIII Div 2 and Div 3 PV

**Subgroup:** Repairs and Alterations

**Task Group:** J. Pillow – PM

**Explanation of Need:** Para 3.3.2 talks about requirements for and examples of routine repairs. It does not specify any restrictions on pressure retaining items construction Code. It states that 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. It states that all other applicable requirements of this code (NBIC) shall be met. Para 3.3.5.1 of NBIC states that the following requirements shall apply for the repair of pressure vessels constructed to the requirements of Section VIII, Division 2 or 3, of the ASME Code. This calls for properly Certified repair plan to be submitted to the Inspector who will make acceptance inspection and sign R-1 Form.

**Update:** A proposal for this item was balloted to Main Committee but failed to pass.

**Meeting Action:** Mr. P. Edwards presented that this item did not receive enough votes to pass Letter Ballot. The single negative vote and the single comment on the LB were considered and responded to. A motion to reaffirm the proposal was made, seconded, and unanimously approved.

<b>Item Number: 19-42</b>	<b>NBIC Location: Part 3, 3.3.3 s) &amp; 3.4.4 g)</b>	<b><a href="#">Attachment 8</a></b>
<b>General Description:</b> 3.3.3 s design intent clarification vs 3.4.3 g		
<b>Subgroup:</b> Repairs and Alterations		
<b>Task Group:</b> P. Shanks – PM		
<b>Explanation of Need:</b> The design requirement in 3.3.3 s) is not well defined and is allowing potentially unsafe material changes to be conducted as repairs without adequate assessment.		
<b>Meeting Action:</b> Mr. P. Shanks presented that he was the inquirer and would like to withdraw his Interp. Request. A motion to Close with No Action was made, seconded, and unanimously approved.		

**New Interpretation Requests:**

<b>Item Number: 19-62</b>	<b>NBIC Location: Part 3, 2.5.3.6</b>	<b><a href="#">Attachment 9</a></b>
<b>General Description:</b> Interpretation for using NBIC Part 3, 2.5.3.6 Welding Method 6 on Grade 92		
<b>Subgroup:</b> Repairs and Alterations		
<b>Task Group:</b> None Assigned.		
<b>Explanation of Need:</b> End-users are experience failures in SA-213 T92 Code Case 2179 material and would like the option to invoke Welding Method 6 for repairs internal to the boiler setting.		
<b>Meeting Action:</b> Mr. J. Siefert presented the proposal. A motion to accept the proposal was made, seconded, and unanimously approved.		

<b>Item Number: 19-66</b>	<b>NBIC Location: Part 3, 3.4</b>	<b><a href="#">Attachment 10</a></b>
<b>General Description:</b> Shell Side Heat Exchanger PWHT		
<b>Subgroup:</b> Repairs and Alterations		
<b>Task Group:</b> Kathy Moore (PM)		
<b>Explanation of Need:</b> An R Certificate Holder is Doing Repair Work on the Shell Side of Heat Exchanger, which was not PWHT Earlier. As per Client Request, Welded Joints are Post weld Heat Treated and Consider as Alteration, Client wants Shell Side to Under Go Full Post weld Heat Treatment Including areas not repaired. NDE is being Carried out for Complete Equipment and Client wants PWHT for Welds which are in Services and without any repairs.		
<b>Meeting Action:</b> Mr. B. Schaefer presented that this inquiry was answered in Interpretation 13-06. A motion to respond to the inquirer with Interp. 13-06 and close this Item was made, seconded, and unanimously approved.		

<b>Item Number: 19-67</b>	<b>NBIC Location: Part 3, 3.4</b>	<a href="#">Attachment 11</a>
<p><b>General Description:</b> Clarification of Part 3, 1.5.1 d) 1)</p> <p><b>Subgroup:</b> Repairs and Alterations</p> <p><b>Task Group:</b> Kathy Moore (PM)</p> <p><b>Explanation of Need:</b> The original submitter interprets the above statement to mean a stamp holder must do repairs or alterations to the NBIC. Clarification is requested as the statement "as applicable" is ambiguous.</p> <p><b>Meeting Action:</b> Mr. Ben Schaefer presented. After discussion and revision, a motion to accept the amended proposal was made, seconded, and unanimously approved.</p>		

<b>Item Number: 19-86</b>	<b>NBIC Location: Part 3, 2.2 &amp; 2.2.1</b>	<a href="#">Attachment 12</a>
<p><b>General Description:</b> National Certified Pipe Welding Bureau (NCPWB) welding procedure specs</p> <p><b>Subgroup:</b> Repairs and Alterations</p> <p><b>Task Group:</b> Kathy Moore (PM)</p> <p><b>Explanation of Need:</b> Some ASME and National Board Certificate Holders have presented NCPWB procedures to Team Leaders (designees) at joint reviews as part of their welding demonstrations, and those companies may not understand the limited scope in which the procedures may be used.</p> <p><b>Meeting Action:</b> Mr. B. Schaefer presented, and after discussion, a motion to accepted the proposal as amended was made, seconded, and approved. (1 – Disapproval – L. Moedinger)</p>		

<b>Item Number: 19-87</b>	<b>NBIC Location: Part 3, 5.6</b>	<a href="#">Attachment 13</a>
<p><b>General Description:</b> Form Registration Log</p> <p><b>Subgroup:</b> Repairs and Alterations</p> <p><b>Task Group:</b> Tim McBee (PM), Robert Underwood</p> <p><b>Explanation of Need:</b> Many "R" Certificate Holders now use the National Board EDT System to register "R" Forms. All of the required log information in paragraph 5.6 of Part 3 is available in EDT, therefore it is unnecessary and redundant for "R" Certificate Holders to maintain a separate log outside the EDT system.</p> <p><b>Meeting Action:</b> Mr. Tim McBee presented, and after discussion, the proposal was motioned, seconded, and unanimously approved as amended.</p>		



<b>Item Number: 20-1</b>	<b>NBIC Location: Part 3, 3.3.2</b>	<b><a href="#">Attachment 14</a></b>
<p><b>General Description:</b> ASME B31.3 Normal Fluid Service and Severe Cyclic have mandatory requirements for radiography.</p> <p><b>Subgroup:</b> Repairs and Alterations</p> <p><b>Task Group:</b> George Galanes (PM)</p> <p><b>Explanation of Need:</b>  Q1 - Are "Routine Repairs" permitted for ASME B31.3 Normal Fluid Service and Severe Cyclic piping?  Proposed Answer: No</p> <p>Q2 - Are "Routine Repairs" permitted for ASME B31.3 Category D Service piping?  Proposed Answer: Yes</p> <p><b>Meeting Action:</b> Mr. Galanes presented. A motion to accept the proposal was motioned, seconded, and unanimously approved.</p>		

<b>Item Number: 20-2</b>	<b>NBIC Location: Part 3, Table 2.3</b>	<b><a href="#">Attachment 15</a></b>
<p><b>General Description:</b> Use of 2018 AWS SWPS's in accordance with the 2019 NBIC</p> <p><b>Subgroup:</b> Repairs and Alterations</p> <p><b>Task Group:</b> Jim Sekely (PM)</p> <p><b>Explanation of Need:</b>  Since Item 18-102 (updating the SWPS Table 2.3 in Part 3 to the current 2018 AWS standards) was not passed by MC until after the 2019 NBIC was published, a number of SWPS's as listed in the 2019 Edition of the NBIC, Table 2.3 are not current. This Interpretation would allow Certificate Holders to utilize the 2018 SWPS's that have been approved for the 2021 Edition of the NBIC</p> <p><b>Meeting Action:</b> Mr. J. Sekely presented and the proposal was motioned, seconded, and unanimously approved.</p>		

<b>Item Number: 20-3</b>	<b>NBIC Location: Part 3, Section 3 &amp;4 Paragraph: 33 44 48 and Form 44</b>	<b>Attachment 16</b>
<p><b>General Description:</b> Inspector involvement in Fitness-for Service assessments</p> <p><b>Subgroup:</b> Repairs and Alterations</p> <p><b>Task Group:</b> J. Siefert (PM), Nathan Carter</p> <p><b>Explanation of Need:</b> Which Inspector (i.e. "IS" Commissioned or "R" Endorsement) signs the FFSA Form NB-403 when an "R" Certificate Holder is involved with a repair in that region as well as determine what level of review of the Fitness-for-Service the Inspector is expected to complete?</p> <p><b>Meeting Action:</b> Mr. Carter presented the proposal. Mr. Galanes proposed creating a new action item to address FFS assessments in Part 3 as a way to handle this. This was a Progress Report</p>		

## 8. Action Items

<b>Item Number: NB15-1405</b>	<b>NBIC Location: Part 3, 1.2</b>	<b>Attachment 17</b>
<p><b>General Description:</b> Impact testing of P-11B Material</p> <p><b>Subgroup:</b> Repairs and Alterations</p> <p><b>Task Group:</b> N. Carter (PM), P. Davis, G. Galanes, P. Shanks</p> <p><b>July 2019 Meeting Action:</b> Mr. G. Galanes presented a progress report.</p> <p><b>Meeting Action:</b> Mr. N. Carter presented his proposal is intended to go to Review and Comment Letter Ballot to SG R&amp;A. This was a Progress Report.</p>		

<b>Item Number: NB15-2208</b>	<b>NBIC Location: Part 3</b>	<b>No Attachment</b>
<p><b>General Description:</b> Develop supplement for repairs and alterations based on international construction standards</p> <p><b>Subgroup:</b> Graphite</p> <p><b>Task Group:</b> Greg Becherer (PM)</p> <p><b>July 2019 Meeting Action:</b> Mr. Monte Bost presented a progress report.</p> <p><b>Update from TG Graphite:</b> A proposal is still in development for this item.</p> <p><b>Meeting Action:</b> No members of the Graphite Task Group were present to present the item. This was a Progress Reports.</p>		

<b>Item Number: NB16-1403</b>	<b>NBIC Location: Part 3, S4</b>	<b>Attachment 18</b>
<p><b>General Description:</b> Add information on repair of high pressure vessels.</p> <p><b>Subgroup:</b> FRP</p> <p><b>Task Group:</b> N. Newhouse (PM)</p> <p><b>July 2019 Meeting Action:</b> Mr. Trout motioned to have this item sent to SC Repairs and Alterations via Letter Ballot for a vote. The motioned was seconded and unanimously approved.</p> <p><b>Update:</b> This item was approved by SC R&amp;A via letter ballot and will be reviewed by Main Committee at the January meeting.</p> <p><b>Meeting Action:</b> No members of the FRP Task Group were present to present the item. This was a Progress Report.</p>		

<b>Item Number: NB16-1502</b>	<b>NBIC Location: Part 3</b>	<b>No Attachment</b>
<p><b>General Description:</b> Develop supplement for repairs and alterations based on international construction standards</p> <p><b>Subgroup:</b> SG Repairs and Alterations</p> <p><b>Task Group:</b> International Repair Supplement Task Group, Chuck Withers (PM)</p> <p><b>July 2019 Meeting Action:</b> Mr. Withers was not present and could not present the item. No action taken.</p> <p><b>Meeting Action:</b> Mr. Hellman presented that no work has been done on this item. A motion to Close with No Action was made, seconded, and unanimously approved.</p>		

<b>Item Number: 17-134</b>	<b>NBIC Location: Part 3, Section 5</b>	<b>No Attachment</b>
<p><b>General Description:</b> Proposed Revision for registration of Form R-1 with the National Board containing ASME pressure part data reports attached.</p> <p><b>Subgroup:</b> Repairs and Alterations</p> <p><b>Task Group:</b> P. Shanks (PM), Rob Troutt, Joel Amato, Kathy Moore, Paul Edwards</p> <p><b>July 2019 Meeting Action:</b> P. Shanks gave a progress report.</p> <p><b>Meeting Action:</b> Mr. P. Shanks presented a Progress Report.</p>		

<b>Item Number: 17-137</b>	<b>NBIC Location: Part 3, S4.18.2</b>	<b>Attachment 19</b>
<p><b>General Description:</b> Remove "sand" blasting and replace with "abrasive" in Part 3, S4.18.2</p> <p><b>Subgroup:</b> FRP</p> <p><b>Task Group:</b> Terry Cowley</p> <p><b>July 2019 Meeting Action:</b> Title on the Attachment shows “18-41”. This will be sent back to FRP TG to verify the attachment is correct for Item 17-137.</p> <p><b>Update:</b> NBIC Secretary Mr. Jonathan Ellis reached out to the project manager about the subcommittee’s inquiry. He received a corrected proposal from Mr. Cowley which is attached to the agenda.</p> <p><b>Meeting Action:</b> Mr. Hellman presented that the proposal submitted should go the SC R&amp;A Letter Ballot. A motion was made, seconded, and unanimously approved.</p>		

<b>Item Number: 17-167</b>	<b>NBIC Location: Part 3, S3.2 d)</b>	<b>No Attachment</b>
<p><b>General Description:</b> Clarify repair inspection requirements for machined only graphite parts.</p> <p><b>Subgroup:</b> Graphite</p> <p><b>Task Group:</b> Aaron Viet (PM)</p> <p><b>July 2019 Meeting Action:</b> M. Bost gave a progress report.</p> <p><b>Update:</b> Work is still being done to develop a proposal for this item.</p> <p><b>Meeting Action:</b> No members of the Graphite Task Group were present to present the item. This was a Progress Reports.</p>		

<b>Item Number: 18-13</b>	<b>NBIC Location: Part 3</b>	<a href="#">Attachment 20</a>
<p><b>General Description:</b> Weld Methods 7 addition for dissimilar weld metal-Gr. 91.</p> <p><b>Subgroup:</b> SG Repairs and Alterations</p> <p><b>Task Group:</b> John Siefert PM, George Galanes</p> <p><b>July 2019 Meeting Action:</b> Mr. John Siefert presented background information and a proposal to have this item sent to Subgroup and Subcommittee R&amp;A for a Letter Ballot Vote with a concurrent Review and Comment Letter Ballot to Main Committee. A motion was made, seconded, and unanimously approved.</p> <p><b>Update:</b> The proposal for this item was approved by SC R&amp;A via letter ballot and will be reviewed by Main Committee at the January meeting.</p> <p><b>Meeting Action:</b> Mr. J. Siefert presented a revised proposal based on comments from B. Boseo, B. Schaeffer, and K. Moore. A motion to send to Letter Ballot for Main Committee was made, seconded, and unanimously approved.</p>		

<b>Item Number: 18-65</b>	<b>NBIC Location: Part 3, Section 3</b>	<a href="#">Attachment 21</a>
<p><b>General Description:</b> Draft rules for “used” material in repairs and/or alterations.</p> <p><b>Subgroup:</b> SG Repairs and Alterations</p> <p><b>Task Group:</b> Jamie Walker – PM, Marty Toth, Pat Becker, Michael Quisenberry, Issac Osborn, Paul Shanks, R. Underwood</p> <p><b>July 2019 Meeting Action:</b> Mr. Jamie Walker gave a progress report.</p> <p><b>Meeting Action:</b> Mr. J. Walker presented. The proposal was revised after much discussion from K. Moore, C. Hopkins, G. Galanes, B. Underwood, and P. Shanks. A motion to accept the proposal as amended was made, seconded, and unanimously approved.</p>		

<b>Item Number: 18-66</b>	<b>NBIC Location: Part 3, Section 5</b>	<a href="#">Attachment 22</a>
<p><b>General Description:</b> Move Report Forms to a new Supplement.</p> <p><b>Subgroup:</b> SG Repairs and Alterations</p> <p><b>Task Group:</b> Marty Toth – PM, Ben Schaefer</p> <p><b>July 2019 Meeting Action:</b> Mr. B. Schaefer gave a progress report.</p> <p><b>Meeting Action:</b> Mr. B. Schaefer presented the changes to move Report Forms and instruction to new Supplement. A motion to move the 5 pages of revisions to a concurrent Letter Ballot for SG R&amp;A and SC R&amp;A with a Letter Ballot to Main Committee if approved via SC R&amp;A Letter Ballot was made, seconded, and unanimously approved.</p>		

<b>Item Number: 18-75</b>	<b>NBIC Location: Part 3</b>	<b>Attachment 23</b>
<p><b>General Description:</b> Flush patches in stayed and un-stayed areas of tubesheets</p> <p><b>Subgroup:</b> SG Repairs and Alterations</p> <p><b>Task Group:</b> Michael Quisenberry (PM), Kathy Moore, Marty Toth, Rick Sturm</p> <p><b>July 2019 Meeting Action:</b> Mr. M. Quisenberry presented. After discussion, the proposal was revised, and a motion to accept the amended proposal was made, seconded, and unanimously approved.</p> <p><b>Update:</b> This proposal was balloted to Main Committee. The ballot received several negative votes and comments, which can be seen on Attachment Page 42.</p> <p><b>Meeting Action:</b> Mr. M. Quisenberry presented a revised proposal addressing the negative votes and comments from the MC Letter Ballot. A motion to accept the amended proposal was made, seconded, and unanimously approved.</p>		

<b>Item Number: 18-93</b>	<b>NBIC Location: Part 3, S3.2, S3.4 4.4.2 6)</b>	<b>No Attachment</b>
<p><b>General Description:</b> Test Duration</p> <p><b>Subgroup:</b> Graphite</p> <p><b>Task Group:</b> J. Clements (PM)</p> <p><b>July 2019 Meeting Action:</b> Mr. M. Bost presented a potential change of “30 minutes” to “10 minutes”, but work was still being done on this Item.</p> <p><b>Update:</b> TG Graphite voted unanimously to close this item with no action. They did so because vessels that fail the currently required 30 minute pressure test may pass a 10 minute pressure test.</p> <p><b>Meeting Action:</b> Mr. Hellman presented that TG Graphite moved to Close with No Action. A motion to Close with No Action was made, seconded, and unanimously approved.</p>		

<b>Item Number: 18-94</b>	<b>NBIC Location: Part 3, S3.2 f), h); S3.4 a), b), c) etc.</b>	<b>No Attachment</b>
<p><b>General Description:</b> G-mark Requirements for Various Repairs/Alteration to Graphite</p> <p><b>Subgroup:</b> Graphite</p> <p><b>Task Group:</b> C. Cary (PM)</p> <p><b>July 2019 Meeting Action:</b> Mr. M. Bost presented a Progress Report.</p> <p><b>Update:</b> Work is being done to develop a proposal for this item.</p> <p><b>Meeting Action:</b> No members of the Graphite Task Group were present to present the item. This was a Progress Report.</p>		

<b>Item Number: 18-95</b>	<b>NBIC Location: Part 3, S1.1.4</b>	<b><a href="#">Attachment 24</a></b>
<p><b>General Description:</b> Revision to Part 3, S1.1.4 to account for new rules for riveted construction</p> <p><b>Subgroup:</b> Locomotive</p> <p><b>Task Group:</b> (L. Moedinger – PM)</p> <p><b>July 2019 Meeting Action:</b> Main Committee voted to send the proposal back to the subgroup for further work.</p> <p><b>Meeting Action:</b> Mr. L. Moedinger presented, and a motion to accept the proposal was made, seconded, and unanimously approved.</p>		

<b>Item Number: 18-100</b>	<b>NBIC Location: Part 3, 3.3.2</b>	<b><a href="#">Attachment 25</a></b>
<p><b>General Description:</b> Revision adding heat exchanger tubes with an outside diameter of ¾” or smaller to NBIC Part 3.3.2 Routine Repairs</p> <p><b>Subgroup:</b> Repairs and Alterations</p> <p><b>Task Group:</b> Marty Toth (PM), B. Schaefer, N. Carter</p> <p><b>July 2019 Meeting Action:</b> This item was approved by SG and SC R&amp;A but was not approved by Main Committee because no current ASME rules or code cases address this repair.</p> <p><b>Meeting Action:</b> Mr. B. Schaefer presented a Progress Report, as this has been reassigned to new Task Group members, (previously Mr. Martinez was PM).</p>		

<b>Item Number: 19-11</b>	<b>NBIC Location: Part 3, 9.1</b>	<b>Attachment 26</b>
<p><b>General Description:</b> Clarify Definition of Authorized Nuclear Inspection Agency (ANIA)</p> <p><b>Subgroup:</b> Repairs and Alterations</p> <p><b>Task Group:</b> None assigned</p> <p><b>Explanation of Need:</b> An ANIA cannot be an Inservice AIA since Endorsements for nuclear inspectors are issued only to new construction AIA's. The requirements for qualified Authorized Nuclear Inspectors/Supervisors are clearly specified in NB-263, RCI-1. Therefore revision to the Glossary definition is needed to clarify this requirement for the NR Accreditation Program.</p> <p><b>July 2019 Meeting Action:</b> Mr. Edwards presented changes to paragraph 1.6.3 in lieu of changes to the glossary that better clarified the definition of an ANIA. The proposal was motioned, seconded, and unanimously approved.</p> <p><b>Update:</b> The proposal was letter balloted to Main Committee but did not receive enough approval votes to pass. There were three negative votes, which can be seen on Attachment Page 51.</p> <p><b>Meeting Action:</b> Mr. P. Edwards presented a revised proposal addressing the ballot comments and negative votes. A motion to accept the amended proposal was made, seconded, and unanimously approved.</p>		

<b>Item Number: 19-16</b>	<b>NBIC Location: Part 3, 3.2.2 e)</b>	<b>Attachment 27</b>
<p><b>General Description:</b> Reword to provide clarity; contradictory requirement Part 3; 3.2.2 e)</p> <p><b>Subgroup:</b> Repairs and Alterations</p> <p><b>Task Group:</b> None assigned</p> <p><b>Explanation of Need:</b> This wording of this clause is causing confusion. The original submitter has had multiple instances where owners have requested to purchase welded replacement parts directly and read this clause with the belief that they can purchase a replacement part for in some cases a welded pressure part for an ASME Section I boiler and save money by having the fabricator not Hydro test as per Section I even when it was not impractical to have the testing performed.</p> <p><b>July 2019 Meeting Action:</b> Mr. White presented and referenced Interpretations 04-05 and 04-11, but he will continue to work on this Item.</p> <p><b>Meeting Action:</b> Mr. P. Edwards presented that Item 19-59 may satisfy the inquirer. Item 19-59 was taken out of order and unanimously approved. A motion to respond to the inquirer of Item 19-16 (Eban Creacer) to see if the revision proposal under Item 19-59 satisfies his request for a Code Revision was made, seconded and unanimously approved.</p>		



Item Number: 19-19	NBIC Location: Part 3, S4.2	Attachment 28
<p><b>General Description:</b> Reword to provide clarity; contradictory requirement Part 3; 3.2.2 e)</p> <p><b>Subgroup:</b> FRP</p> <p><b>Task Group:</b> None assigned</p> <p><b>Explanation of Need:</b> The current use of the term "inspector" in S4.2 does not mean a Commissioned Inspector as defined in Section 9. Clarification is needed.</p> <p><b>July 2019 Meeting Action:</b> A Mr. T. Hellman presented replacing the word “inspector” with “designee” as referenced in S4.2 to remove any confusion that the “designee” is not a NB Commissioned Inspector. A motion was made, seconded, and unanimously approved.</p> <p><b>Update:</b> This item is up for ballot to the Main Committee.</p> <p><b>Meeting Action:</b> No action taken. This passed Main Committee letter ballot.</p>		

Item Number: 19-27	NBIC Location: Part 3, S2.13.14.3-a	Attachment 29
<p><b>General Description:</b> Fusible Plug Repair Using Half Coupling Figure</p> <p><b>Subgroup:</b> SG Historical</p> <p><b>Task Group:</b> B. Underwood (PM)</p> <p><b>July 2019 Meeting Action:</b> Mr. J. Amato presented and a motion to accept the proposal was made, seconded, and unanimously approved.</p> <p><b>Update:</b> This item is up for ballot to the Main Committee.</p> <p><b>Meeting Action:</b> Mr. Underwood presented that this proposal was revised to reflect MC LB comments. A motion to accept the proposal as amended was made, seconded, and unanimously approved.</p>		

Item Number: 19-55	NBIC Location: Part 3, 4.4.2 a) 1)	Attachment 30
<p><b>General Description:</b> Change the maximum test pressure requirement when performing liquid pressure tests of repair activities.</p> <p><b>Subgroup:</b> Repairs and Alterations</p> <p><b>Task Group:</b> Robert Underwood – PM</p> <p><b>Explanation of Need:</b> To change the maximum test pressure requirement when performing liquid pressure tests of repair and alteration activities. This proposal was initially part of item NB16-2603, which proposed changes to 4.4.1 a) 1) and 4.4.2 a) 1). However, only the changes to 4.4.1 a) 1) made it into the 2019 NBIC.</p> <p><b>Update:</b> This item will be up for letter ballot to Main Committee prior to the January meeting.</p> <p><b>Meeting Action:</b> This was approved at MC LB 1/12/2020. Item Closed.</p>		

**New Items:**

<b>Item Number: 19-59</b>	<b>NBIC Location: Part 3, 3.2.2 e)</b>	<b><a href="#">Attachment 31</a></b>
<b>General Description:</b> Pressure Tests for Replacement Parts		
<b>Subgroup:</b> Repairs and Alterations		
<b>Task Group:</b> Paul Edwards – PM		
<b>Explanation of Need:</b> ASME has issued interpretation I-16-1 and revised PW-54 to clarify that Section I does not contain requirements for the hydrostatic testing of replacement parts. Based on this, the language in 3-3.2.2 e) "... as required by the original code of construction" could be interpreted to mean that pressure testing of parts is not required because Section I does not require testing of replacement parts. On review, this was not the Committee's intent when clause e) was added to 3.2.2. The proposed intent interpretation and a supporting text revision is provided to clarify this issue. By linking the words "original code of construction" to the test pressure, it eliminates the potential interpretation that testing is only required when the original code of construction specifically requires testing of replacement parts.		
<b>Meeting Action:</b> Mr. P. Edwards presented that this Item is related to Interp. Item 19-34. Mr. Galanes commented that this may also satisfy Item 19-16. After discussion, a motion to accept the proposal was made, seconded, and unanimously approved. A letter to the inquirer of Item 19-16 (Eban Creacer) to be sent to see if this revision satisfies the revision requested in Item 19-16.		

<b>Item Number: 19-60</b>	<b>NBIC Location: Part 3, 1.5.1</b>	<b><a href="#">Attachment 32</a></b>
<b>General Description:</b> Quality System For Qualification For The National Board "R" Certificate		
<b>Subgroup:</b> Repairs and Alterations		
<b>Task Group:</b> Ray Milette (PM), Paul Davis, K. Moore, B. Boseo, M. Toth, P. Shanks, M. Quisenberry, R. Sturm		
<b>Explanation of Need:</b> Part 3, 1.5.1 provides a good outline for a Quality Systems Manual. However, the elements need to be embellished to provide a more auditable description of each element.		
<b>Meeting Action:</b> Mr. Boseo commented that Items 19-47 and 19-48 were both closed and the scope for this item expanded to address all elements in 1.5.1. The attached proposal addresses only calibration. New Item 19-82 (Safety Verbiage addition) to be included in this Item's scope. This was a Progress Report.		

<b>Item Number: 19-61</b>	<b>NBIC Location: Part 3, 3.3.4</b>	<b>No Attachment</b>
<p><b>General Description:</b> Quality System For Qualification For The National Board “R” Certificate</p> <p><b>Subgroup:</b> Repairs and Alterations</p> <p><b>Task Group:</b> None assigned.</p> <p><b>Explanation of Need:</b> Threaded insert are being used to fix a bolt that has broken off on certain types of boilers (autoclaves) which hold the heating elements in the water side of the boiler. When this happens, the technician correcting the problem will simply drill out the broken bolt with an over sized bit and inset a metallic insert. NBIC does address this this type of alteration.</p> <p><b>Meeting Action:</b> Mr. P. Shanks presented a Progress Report.</p>		

<b>Item Number: 19-68</b>	<b>NBIC Location: Part 3, 1.6</b>	<b>No Attachment</b>
<p><b>General Description:</b> Quality System For Qualification For The National Board “R” Certificate</p> <p><b>Subgroup:</b> Repairs and Alterations</p> <p><b>Task Group:</b> None assigned.</p> <p><b>Explanation of Need:</b> Review of 1.6 for possible requirement for ANI's and ANII's to hold the (R) Endorsement for "NR" activities.</p> <p><b>Meeting Action:</b> Mr. P. Edwards presented a Progress Report.</p>		

<b>Item Number: 19-69</b>	<b>NBIC Location: Part 3, 5.12.5.1 8) &amp; 5.12.5.1 11)</b>	<b>Attachment 33</b>
<p><b>General Description:</b> Review verbiage in Part 3, 5.12.5.1 8) and 5.12.5.1.11)</p> <p><b>Subgroup:</b> Repairs and Alterations</p> <p><b>Task Group:</b> Ben Schaefer - PM</p> <p><b>Explanation of Need:</b> Review verbiage in Part 3, 5.12.5.1 8) and 5.12.5.1.11) to include "Code Case" and "Code Edition" within the text.</p> <p><b>Meeting Action:</b> Mr. B. Schaefer presented a revised proposal with the comment that the approval of Action Item 18-66 would require revision to this proposal. The proposal was motioned, seconded, and unanimously approved.</p>		

<b>Item Number: 19-73</b>	<b>NBIC Location: Part 3, S3</b>	<b>No Attachment</b>
<p><b>General Description:</b> Requirements for who can make hole plugging repairs on graphite blocks</p> <p><b>Subgroup:</b> Graphite</p> <p><b>Task Group:</b> C. Cary (PM), A. Viet, A. Stupica</p> <p><b>Explanation of Need:</b> Performing hole plugging repairs in graphite blocks is a common repair for graphite pressure vessels, but the NBIC currently has no formal requirements for this type of repair.</p> <p><b>Meeting Action:</b> No members of the Graphite Task Group were present to present the item. This was a Progress Report.</p>		

<b>Item Number: 19-74</b>	<b>NBIC Location: Part 3, S3.3</b>	<b>No Attachment</b>
<p><b>General Description:</b> Routine repair requirements for partial nozzle replacement</p> <p><b>Subgroup:</b> Graphite</p> <p><b>Task Group:</b> A. Stupica (PM), M. Bost</p> <p><b>Explanation of Need:</b> Currently only nozzle replacement is addressed as a routine repair. The group is planning on defining the types of partial nozzle replacements and repairs that could be defined as routine.</p> <p><b>Meeting Action:</b> No members of the Graphite Task Group were present to present the item. This was a Progress Report.</p>		

<b>Item Number: 19-82</b>	<b>NBIC Location: Part 3, 1.5.1 j)</b>	<b>Attachment 34</b>
<p><b>General Description:</b> Review verbiage in Part 3, 5.12.5.1 8) and 5.12.5.1.11)</p> <p><b>Subgroup:</b> Repairs and Alterations</p> <p><b>Task Group:</b> M. Quisenberry (PM)</p> <p><b>Explanation of Need:</b> Safety is not addressed in Part 3. This verbiage could be added to the 1.5.1 j) Method of Performing Work paragraph so Certificate Holders can address the safety concerns specific to their scope of activities.</p> <p><b>Meeting Action:</b> Mr. M. Quisenberry was recently selected as the PM and presented this as a Progress Report. The intent is to add this to the scope of current Action Item 19-60 and close this Item with no action at the next meeting.</p>		

<b>Item Number: 19-91</b>	<b>NBIC Location: Part 3, 5.6</b>	<b><a href="#">Attachment 35</a></b>
<b>General Description:</b> Form Registration Log		
<b>Subgroup:</b> Repairs and Alterations		
<b>Task Group:</b> B. Underwood (PM)		
<b>Explanation of Need:</b> Many "R" Certificate Holders now register R Forms in the National Board Electronic Data Transfer (EDT) System. The EDT system contains all of the required log information listed in paragraph 5.6 of Part 3, which makes it unnecessary and redundant for the "R" Cert. Holder to maintain a separate log.		
<b>Meeting Action:</b> Mr. B. Underwood presented that this proposal is related to Int. Item 19-87. After discussion, a motion to accept the proposal was made, seconded, and unanimously approved.		

<b>Item Number: 19-92</b>	<b>NBIC Location: Part 3, 1.5.1 j)</b>	<b><a href="#">Attachment 36</a></b>
<b>General Description:</b> Adding "Document Designation" as the second column title in Table 2.3		
<b>Subgroup:</b> Repairs and Alterations		
<b>Task Group:</b> Jim Sekely – PM		
<b>Explanation of Need:</b> This change is being requested so that NBIC matches the naming used by AWS.		
<b>Meeting Action:</b> Mr. J. Sekely presented and a motion to accept the proposal was made, seconded, and unanimously approved.		

<b>Item Number: 20-4</b>	<b>NBIC Location: Part 3, Table 2.3</b>	<b><a href="#">Attachment 37</a></b>
<b>General Description:</b> Updates to SWPS's to the 2019 edition pending approval of Action Item 19-92		
<b>Subgroup:</b> Repairs and Alterations		
<b>Task Group:</b> Jim Sekely (PM).		
<b>Explanation of Need:</b> Revised SWPS's B2.1-1-201:2019 through B2.1-14-209: 2019 to Table 2.3		
<b>Meeting Action:</b> Mr. J. Sekely presented and a motion to accept the proposal was made, seconded, and unanimously approved.		

**9. Future Meetings**

- July 13<sup>th</sup>-16<sup>th</sup>, 2020 – Louisville, KY
- January 11<sup>th</sup>-14<sup>th</sup>, 2021 – New Orleans, LA

**10. Adjournment**

There being no further business before the Subcommittee, the Chair adjourned the meeting at 2:52 PM, without objection.

Respectfully submitted,

A handwritten signature in black ink, reading "Terrence Hellman". The signature is written in a cursive style with a long horizontal flourish at the end.

Terrence Hellman  
Repairs and Alterations

NBIC Subcommittee R&A Attendance - 1/15/2020

First Last	Email	Company	Phone #	Signature	Attending Reception?
Brian Boseo	brian_boseo@graycor.com	Graycor	630 684-7300		✓
Craig Hopkins	chopkins@seattleboiler.com	Seattle Boiler Works	206 762-0737		✓
Ray Miletti	RLMILETTI@BABCOCK.COM	Babcock & Wilcox	330 860-2589		✓
James Sekely	jsekely@comcast.net	Consultant	412 389-5567		✓
Paul Edwards	edwardsp4@asme.org	Stone & Webster	617 483-5315		✓
Wayne Jones	Wayne.Jones@tuvsud.com	ARISE	251 937-6225		✓
Brian Morelock	morelock@eastman.com	Eastman Chemical Company	423 229-1205		✓
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Kathy Moore	kathymoore@joemoorecompany.com	Joe Moore & Company, Inc.	919 832-1665		✓
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Terrence Hellman	thellman@nationalboard.org	The National Board	614 431-3234		✓
Patricia Becker	pabecker@babcock.com	Babcock & Wilcox	330 860-2807		✓
Michael Quisenberry	michael@allentri.com	Allen's Tri-State Mechanical	806 316-8345		✓
John Siefert	jsiefert@epri.com	EPRI	704 595-2886		✓
Timothy McBee	Timothy.McBee@tuvsud.com	ARISE	217 412-9300		✓
Paul Shanks	paul.shanks@onecis.com	OneCIS	832 316-4249		NO
Eric Cotlip	eventlip@babcock.com	B+W	330 860-2637		✓
Matthew Scarsone	Matthew.Scarsone@luber.ny.gov	LPS	585 303-1310		✓





**Interpretation IN19-5**  
**Proposed Interpretation**

<b>Inquiry:</b>	IN19-5
<b>Source:</b>	
<b>Subject:</b>	NBIC Part 3 Section Part 3, 3.2.6
<b>Edition:</b>	2017
<b>General Description:</b>	
<b>Question 1:</b>	Can user's opinion, categorization and proposed Repair methods be considered under NBIC Part 3, 3.2.6?
<b>Reply 1:</b>	No
<b>Committee's Question 1:</b>	<del>Can <u>May</u> a bolt hole in a SA350-LF2 flange be <u>considered a</u> repaired using SA-105 material that is welded using a Welding Procedure Specification (WPS) that was qualified without postweld heat treatment (PWHT) and without impact testing?</del>
<b>Committee's Reply 1:</b>	<del>This is consulting <u>No</u>. <u>This cannot be completed as a Repair.</u></del>
<b>Question 2:</b>	Does AI have final authority to take decision under Part 3, 3.2.6 when jurisdiction does not exist?
<b>Reply 2:</b>	Yes
<b>Committee's Question 2:</b>	<del>Does the Inspector have final authority for review and acceptance of a repair by a repair organization that has an "R" Certificate of Authorization under Part 3, 3.2.6 when <u>jurisdiction a Jurisdiction</u> does not exist?</del>
<b>Committee's Reply 2:</b>	<del>Yes.</del>
<b>Rationale:</b>	NBIC Part 3, Section 3.2.6
<b>SC Vote</b>	
<b>NBIC Vote</b>	

**Rationale:**

**3.2.6 REFERENCE TO OTHER CODES AND STANDARDS**

Other codes, standards, and practices pertaining to the repair and alteration of pressure retaining items can provide useful guidance. Use of these codes, standards and practices is subject to review and acceptance by the Inspector, and when required, by the Jurisdiction. The user is cautioned that the referenced codes, standards and practices may address methods categorized as repairs; however, some of these methods are considered alterations by the NBIC.

In the event of a conflict with the requirements of the NBIC, the requirements of the NBIC take precedence.

Some examples are as follows:

- a) National Board *BULLETIN* - National Board Classic Articles Series;
- b) ASME PCC-1, Guidelines for Pressure Boundary Bolted Flange Joint Assembly;
- c) ASME PCC-2, Repair of Pressure Equipment and Piping.

## **ASME Section IIA, SA-350/SA-350M, 2017 ED, SPECIFICATION FOR CARBON AND LOW-ALLOY STEEL FORGINGS, REQUIRING NOTCH TOUGHNESS TESTING FOR PIPING COMPONENTS**

### **4. General Requirements**

4.1 Product furnished to this specification shall conform to the requirements of Specification A 961, including any supplementary requirements that are indicated in the purchase order. Failure to comply with the general requirements of Specification A 961 constitutes nonconformance with this specification. In case of conflict between the requirements of this specification and Specification A 961, this specification shall prevail.

### **7.2 Impact Test:**

7.2.1 Requirements — The material shall conform to the requirements for impact properties in Table 3 when tested at the applicable standard temperature in Table 4 within the limits of 7.2.4.2 and 7.2.4.3.

### **11. Rework and Retreatment**

11.3.1 Repair by welding shall be made using welding procedures and welders qualified in accordance with ASME Section IX of the Code. The weld procedure qualification test shall also include impact tests of the weld metal and heat-affected zone. All impact test specimens shall have the longitudinal axis transverse to the weld and the base of the notch normal to the weld surface.

## **ASTM A 961: Standard Specification for Common Requirements for Steel Flanges, Forged Fittings, Valves, and Parts for Piping Applications**

### **12. Impact Requirements**

12.1 The part shall conform to the impact requirements prescribed in the product specification.

### **Background Information IN19-5 from the Inquirer:**

Saudi Aramco Hawiyah Gas Plant (User) requested Repair to one of their Floating tube sheet Heat Exchanger (UHX-14.1(a)). The user requested repair organization to plug all bolt holes of floating tube sheet using Plug material SA-105 and close by welding. New holes were drilled at center of the ligament of previously drilled bolt holes as required by original drawing of the heat exchanger. No design has been performed and method classified as "Repair".

It is informed that the floating tube sheet has shrunk during service and due to which after dismantling it was difficult to reassemble the Floating tube sheet.

Tube Sheet Material is SA350 LF2 Class-1. WPS used to close holes is without PWHT and without impact.

National Board Inspector rejected the repair method with the following understanding:

1. Welding on SA-350 forging shall meet requirement for Repair of Base Material in accordance with SA 350 and Section 11.8.
2. Integrity of this Flange is compromised as it is Plugged with SA 105 Material and welded for 5 mm with Groove on both Side. This methodology of Repairing Base material is not approved as per Code

AIS Concurred and provided his Opinion to AI question as follows:

1. Welding on SA-350 forging shall meet requirement for Repair of Base Material in accordance with SA-350 and Section 11.8

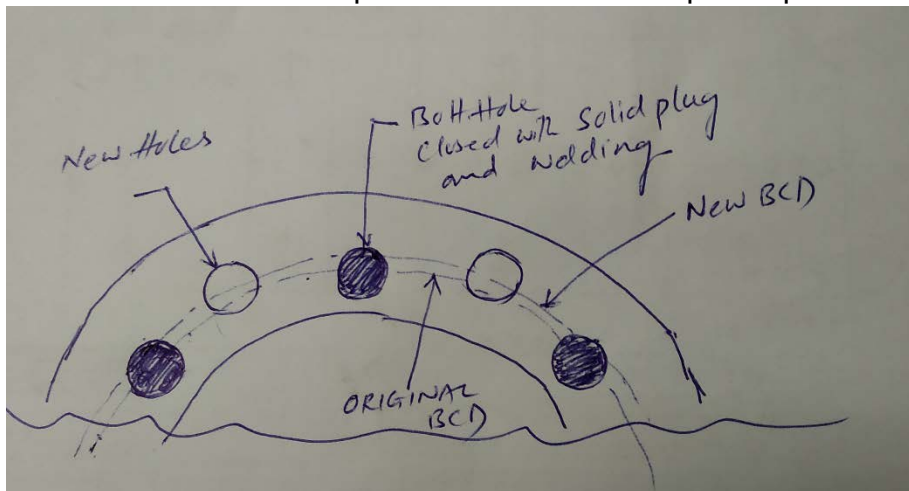
AIS Opinion: **All types of repairs are not addressed in NBIC however para 3.2.6 shall be applicable and to be complied.**

2. Integrity of this Flange is now compromised as it is Plugged with SA 105 Material and welded for 5 mm with Groove on both Side. This methodology of Repairing Base material is not approved as per Code

AIS Opinion: **Refer my comments above, the user is cautioned in para 3.2.6 that the referenced codes, standards and practices may address methods categorized as repairs. These methods/Practices must be accepted by AI.**

Questions:

1. Can user opinion, categorization and acceptance of Repair methods be considered under NBIC Para 3.2.6, Part 3?
2. Does NB consider this repair method as an acceptable practice?



## PROPOSED INTERPRETATION

<b>Inquiry No.</b>	19-10
<b>Source</b>	Paul Shanks
<b>Subject</b>	Interpretations
<b>Edition</b>	2017, <a href="#">Part 3, 8.1 b)</a>
<b>Question</b>	May an interpretation issued to a past NBIC edition be used in any other NBIC edition when the words in the NBIC paragraph are the same? (See Part 3, Introduction, Interpretations for text reference)
<b>Reply</b>	Yes if the NBIC has not changed the requirements pertaining to the interpretation
<b>Committee's Question</b>	May an interpretation issued to <del>aan past-earlier</del> NBIC Edition be used for any other NBIC Edition when the requirements of the NBIC are the same?
<b>Committee's Reply</b>	Yes.
<b>Rationale</b>	<p>NBIC currently limits each interpretation to the edition it was issued for. However, often time the words in question do not change from one edition to another. At present a new interpretation would be needed for each edition of the NBIC to address the same issues, this is a delay to field work and a drain on NBIC committee time.</p> <p><b>Background Information:</b> Understandably each request for interpretation does not require a change to the words in the NBIC, but given the same NBIC words and consistent committee approach to resolving interpretations the same answer should be provided from one edition to the next. But this would cause a delay in working to a standard accepted practice and would consume time for the committee answering the same base question each year. Further the proposed approach is that which ASME currently employs and whilst NBIC and ASME are different they do operate within the same industrial sphere so the proposed interpretation is not unusual.</p>
<b>SC Vote</b>	
<b>NBIC Vote</b>	

<b>Negative Vote Comments</b>	
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## PROPOSED INTERPRETATION

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<b>Inquiry No.</b>	Item 19-25
<b>Source</b>	M.A. Shah <a href="mailto:abmindustrialservices@gmail.com">abmindustrialservices@gmail.com</a>
<b>Subject</b>	<p>This inquiry seeks an interpretation of NBIC Part 3, 4.4.2 c), which states the following:</p> <p>c) Nondestructive Examination</p> <p>NDE may be conducted when contamination of the pressure-retaining item by liquids is possible or when pressure testing is not practicable. Concurrence of the owner shall be obtained in addition to the Inspector, and where required, the Jurisdiction. Exclusive use of Visual Examination (VT) shall not be permitted. In all cases NDE methods or combination of methods used shall be suitable for providing meaningful results to verify the integrity of the alteration.</p>
<b>Edition</b>	2017
<b>Explanation of Need</b>	For ASME BPV Section VIII Division 2 Vessel is under Alteration with Re-rate of lowering MAWP & increasing of Design Temperature & there is no physical alteration in the Vessel but only change is in the Alteration design report because of different design stress intensity value at higher design temperature.
<b>Question</b>	In lieu of a liquid pressure test, what kind of NDE methods or combination of methods used shall be suitable for providing meaningful results to verify the integrity of the alteration?
<b>Reply</b>	No further NDE shall be required as there is no Physical Alteration for the Vessel.
<b>Committee's Question 1</b>	An alteration to a Section VIII Div. 2 <del>and/or Div. 3</del> vessel is performed by lowering the MAWP and increasing the design temperature. No physical work was performed on the vessel. Calculations confirm that the hydrostatic test pressure for the new MAWP and design temperature would be higher than that of the original hydrostatic test pressure. Is a new hydrostatic test required after the alteration is completed?
<b>Committee's Reply 1</b>	Yes, except as provided in Part 3, 4.4.2.c.
<b>Committee's Question 2</b>	The NBIC Part 3, 4.4.2.c provides rules for performing NDE in lieu of a hydrostatic test of an alteration. Is it required that concurrence of the owner, the Inspector, <u>the Certifying Engineer if applicable</u> , and when required, the Jurisdiction be obtained regarding the NDE methods, or combination of methods, to be used to verify the integrity of the alteration?
<b>Committee's Reply 2</b>	Yes, <u>in accordance with Part 3, 3.4.5.</u>
<b>Rationale</b>	NBIC Part 3, Section 3.3.4, Section 4.4.2. and Section 9.1
<b>SC Vote</b>	
<b>NBIC Vote</b>	

<b>Negative Vote Comments</b>	
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## Relevant Background

NBIC Section 3.4.4 clearly states that an example of an alteration is an increase in the design temperature for the pressure retaining item. Furthermore, the definitions section 9.1 states that nonphysical changes such as an increase in the design temperature shall be considered an alteration. Thus, in the background information provided by the requestor, it is clear that this scenario describes a vessel which has been altered.

### Page 68, Section 3, Part 3

#### 3.4.4 EXAMPLES OF ALTERATIONS

(17)

- 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;

### Page 237, Section 9, Part 3

**Alteration** — A change in the item described on the original Manufacturer's Data Report which affects the pressure containing capability of the pressure-retaining item. (See NBIC Part 3, 3.4.3, *Examples of Alteration*) Nonphysical changes such as an increase in the maximum allowable working pressure (internal or external), increase in design temperature, or a reduction in minimum temperature of a pressure-retaining item shall be considered an alteration.

The 'explanation of need' now links to the relevant Section 4.4.2 which requires that one of the following shall be applied to an activity considered to be an alteration: liquid pressure test; pneumatic test; or nondestructive examination. The NBIC does not describe which NDE methods are acceptable, merely that: *concurrence of the owner and inspector and possibly the jurisdiction shall be obtained; that visual examination is not sufficient; and the selected method shall be suitable to provide meaningful results verifying the integrity of the vessel.*

### Page 73, Section 4, Part 3

#### 4.4.2 TEST OR EXAMINATION METHODS APPLICABLE TO ALTERATIONS

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

- a) Liquid Pressure Test
- b) Pneumatic Test
- c) Nondestructive Examination



## Relevant Interpretations

### INTERPRETATION 93-5

**Subject:** Chapter III, R-503(d)

1992 edition

**Question:** If a pressure test required for a re-rated vessel is less than or equal to the hydrostatic test performed during construction, is a new pressure test required after the re-rating is completed?

**Reply:** No, provided no physical work is performed.

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### 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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**INTERPRETATION 98-34**

**Subject:** RC-3030 Examination and Testing

1995 Edition with the 1996 Addendum

**Question:** When the design rated capacity of a boiler is increased without physical work such that the design pressure and temperature are unaffected, is it required to perform a pressure test in accordance with the NBIC?

**Reply:** No.

## Interpretation IN19-26

### Proposed Interpretation

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

Include in response letter: **NA**

**Rationale:**

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

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

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

**19-34 – Edwards – 12-23-19**

**Background** – This Item is a proposed Intent Interpretation to Part 3, 3.2.2 e). The original request and supporting information by the Inquirer are attached. The proposed interpretation was unanimously approved by SC-R/A in July 2019 but withdrawn at Main Committee pending action on a corresponding code revision.

**Proposed Action** – Reaffirm the attached Interpretation to Part 3, 3.2.2 e), without change, in conjunction with the proposed revision under Item 19-59.

**PROPOSED INTERPRETATION**

<b>Inquiry No.</b>	<b>19-34</b>
<b>Source</b>	GE Power
<b>Subject</b>	NBIC Part 3, paragraph 3.2.2 e), Pressure Testing of Replacement Parts
<b>Edition</b>	2017
<b>Question</b>	NBIC Part 3 paragraph 3.2.2 e) states that the replacement part shall receive a pressure test as required by the original code of construction. ASME has issued an interpretation (I-16-6) clarifying that Section I does not provide rules for hydrostatic testing of parts supplied for repair or alteration of existing boilers. Is it the intent of 3.2.2 e) that the reference to the original code of construction is for determining the hydrostatic test pressure?
<b>Reply</b>	Yes
<b>Committee's Question</b>	NBIC Part 3 paragraph 3.2.2 e) states that the replacement part shall receive a pressure test as required by the original code of construction. Is it the intent of 3.2.2 e) that the reference to the original code of construction is for determining the pressure used for the hydrostatic test?
<b>Committee's Reply</b>	Yes
<b>Rationale</b>	ASME has issued interpretation I-16-1 and revised PW-54 to clarify that Section I does not contain requirements for the hydrostatic testing of replacement parts. Based on this, the language in 3-3.2.2 e) "... as required by the original code of construction" could be interpreted to mean that pressure testing of parts is not required because Section I does not require testing of replacement parts. On review, this was not the Committee's intent when clause e) was added to 3.2.2. The proposed intent interpretation and a supporting text revision is provided to clarify this issue. By linking the words "original code of construction" to the test pressure, it eliminates the potential interpretation that testing is only required when the original code of construction specifically requires testing of replacement parts.
<b>SC Vote</b>	
<b>NBIC Vote</b>	
<b>Negative Vote Comments</b>	

**INFORMATION ONLY**

**Background Materials Submi**

NBIC Part 3 Section 3 paragraph test as required by the original code consistently by all users of the code of construction." ASME issued interpretations that do not contain requirements for the test, the words "... as required by the original code of construction." testing of the parts is not required. I think that was the Committee's interpretation and proposed revision "original code of construction" to be required when the original code

Proposed Intent Interpretation:  
Question: NBIC Part 3 paragraph required by the original code of construction does not provide rules for hydrostatic test (intent of 3.2.2 e) that the referee requires for the test pressure?  
Reply: Yes.

Associated Revision:  
e) Replacement parts address pressure determined for the code of construction original code of construction. If ~~the original code of construction~~ code of construction pressure test provisions or a combination of the existing code or 4.4.2 (for alterations). The R section of the R Form the exam tested at the pressure determined for the code of construction.

Background Information:

NBIC Part 3 Section 3 paragraph

- e) Replacement parts address original code of construction original code of construction code of construction pressure test provisions accept the use of one Section 4, paragraph 4.4.1 (for alterations) for completing the R Form statement test(s) performed, and the referee requires for the test code of construction.

**ASME Interpretation I-16-6**

Standard Designation: BPV 1  
Edition/Addenda: 2015  
Para./Fig./Table No: PW-54  
Subject Description: Section I latest Interpretation  
Date Issued: 08/16/2016  
Record Number: 13-942  
Interpretation Number: BPV I-16-6  
Question(s) and Reply(ies): Question: Is it intended for use in the interpretation regarding hydrostatic test or alteration of existing code of construction?  
Reply: No. Section I does not apply to Existing Boilers.

**INFORMATION ONLY**

2017 Addition to PW-54

**PW-54.4** Refer to [A-64](#) as guidance for welded pressure parts supplied to the user of an existing boiler as replacement or repair parts. (17)

A-64

**A-64 REPAIRS TO EXISTING BOILERS**

Where repairs are necessary that in any way affect the working pressure or safety of a boiler, a state inspector, municipal inspector, or an inspector employed regularly by an insurance company, which is authorized to do a boiler insurance business in the state in which the boiler is used, shall be called for consultation and advice as to the best method of making such repairs; after such repairs are made they shall be subject to the approval of a state inspector, municipal inspector, or an inspector regularly employed by an insurance company that is authorized to do a boiler insurance business in the state in which the boiler is used.



## 19-36, Edwards, 12-23-19

**Background** – This item is an inquiry on Part 3, 3.3.2 and 3.3.5, regarding the application of routine repairs on ASME VIII-2 and ASME VIII-3 vessels. The proposed Interpretation (see attached) was voted unanimously by SC-R/A and submitted for Main Committee letter ballot. The MC ballot failed with 1 negative and 1 approved with comment.

Committee Member: Donald Cook      Vote Date: 2019-09-27      Vote: Disapproved      Uploads:

Member Comment: Wouldn't it be clearer to answer the inquirers question #1 with a "No". Everything else becomes unnecessary with a simple question and response.

PM Reply: Because I am familiar with the NBIC requirements relating to routine repairs I am personally willing to make the suggested changes if the Committee prefers. My reason for adding the other questions and replies is because the rational explaining why a particular answer is given is for use by the Committee and is not published with the interpretation for use by the public. I thought it prudent to walk the inquirer through the "rational" via additional questions and replies.

Committee Member: Robby Troutt      Vote Date: 2019-09-27      Vote: Approved      Uploads:

Member Comment: I approve this interpretation; however recommend a change to the first sentence of the rationale to say the same as the first sentence of NBIC Part 3, 3.3.2.a). Recommend the following for the rationale: 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. The rules described in Part 3, 3.3.5.2(b) are clear that the Inspector must make an acceptance inspection of the repair.

PM Reply: Thank you for approving the item and for the comment. Providing the rational is for the benefit of the Committee when considering the proposed interpretation. Because of the Committee members' general familiarity with the NBIC rules, I think the rational provided is sufficient and prefer not to make the suggested changes.

**Proposed Action** – On review, the ballot comments are noted as suggested clarifications of the proposed action, rather than objection to the basis of the questions and replies. In consideration of the PM responses, the proposed action is to reaffirm the previous proposal, without change, for reconsideration by the Main Committee.

PROPOSED INTERPRETATION

<b>Inquiry No.</b> <b>19-36</b>	Part 3, Section 3, 3.3.2 and 3.3.5, Routine Repairs of Section VIII Div.2 and Div.3 Pressure Vessels
<b>Source</b>	Inquirer: Narayanan Murugappan NBIC Committee PM: Jim Pillow
<b>Subject</b>	Part 3, Section 3, 3.3.2 Routine Repairs and 3.3.5 Repair of Section VIII Div.2 and Div.3 Pressure Vessels
<b>Edition</b>	2017
<b>Question</b>	<p><b>Inquirer's Proposed Q and R</b></p> <p><b>Question 1:</b> Is Routine Repairs defined para 3.3.2 applicable to pressure vessels constructed to ASME Section VIII Division-2 and 3?</p> <p><b>Proposed Reply 1:</b> Yes.</p> <p><b>Question 2:</b> If the answer to the above question is Yes, are requirements specified in Para 3.3.5 to be followed for routine repairs to pressure vessels constructed to ASME Section VIII Division-2 and 3?</p> <p><b>Proposed Reply 2:</b> Yes.</p>
<b>Reply</b>	
<b>Committee's Question</b>	<p>Q1; Is a repair plan required for all repairs of an ASME Section VIII Div. 2 or Div. 3 pressure vessel?</p> <p>Q2: May the repair plan for an ASME Section VIII Div.2 or Div.3 pressure vessel be accepted by the Inspector in lieu of the Authorized Inspection Agency or the Owner-User Inspection Organization?</p> <p>Q3: Must the Authorized Inspection Agency's or the Owner-User Inspection Organization's Inspector make an acceptance inspection of the repair of an ASME Section VIII Div.2 or Div.3 pressure vessel?</p> <p>Q4: Are routine repairs defined in Part 3, Section 3, 3.3.2, applicable to pressure vessels constructed to ASME Section VIII Div.2 or Div.3?</p>

<b>Committee's Reply</b>	<p>R1: Yes. See Part 3, 3.3.5.2.</p> <p>R2: No. See Part 3, 3.3.5.2(b).</p> <p>R3: Yes. See Part 3, 3.3.5.2(b).</p> <p>R4: No. Inspection of the repair by the Inspector is required.</p>
<b>Rationale</b>	The rules for routine repairs do not require in process involvement by the Inspector to inspect and accept the repair. The rules described in Part 3, 3.3.5.2(b) are clear that the Inspector must make an acceptance inspection of the repair.
<b>SC Vote</b>	
<b>NBIC Vote</b>	
<b>Negative Vote Comments</b>	

### **BACKGROUND/INQUIRER'S REQUEST**

**Explanation of Need:** Para 3.3.2 talks about requirements for and examples of routine repairs. It does not specify any restrictions on pressure retaining items construction Code. It states that 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. It states that all other applicable requirements of this code (NBIC) shall be met. Para 3.3.5.1 of NBIC states that the following requirements shall apply for the repair of pressure vessels constructed to the requirements of Section VIII, Division 2 or 3, of the ASME Code. This calls for properly certified repair plan to be submitted to the Inspector who will make acceptance inspection and sign R-1 Form.

**Background Information:** The recent interpretations issued by NBIC are reproduced below.

INTERPRETATION 17-17

Subject: Repair and alteration of Section VIII Division 2 items

Edition: 2017

Question: Is it permissible to perform a repair or alteration on an ASME Section VIII, Division 2 pressure vessel in accordance with the NBIC when the original User's Design Specification (UDS) and/or the Manufacturer's Design Report (MDR) is not available?

Reply: No. The Repair/Alteration Plan is required to be compatible with the UDS and MDR per the NBIC Part 3, Sections 3.3.5 and 3.4.5.

Item 19-42 – Interpretation Request  
Submitted by: Paul Shanks [paul.shanks@onecis.com](mailto:paul.shanks@onecis.com)

**NBIC Location:** Part 3, 3.3.3 s) and 3.4.4 g)

**Explanation of Need:** The design requirement in 3.3.3 s) is not well defined and is allowing potentially unsafe material changes to be conducted as repairs without adequate assessment.

**Background Information:** Most pressure vessel parts are design in isolation from those around them or connected to them, heads and shell for example. There are however some components which take strength from or are subject to stresses imposed from adjacent components. For example, body flanges and bolting or tube sheets and the tubes. 3.3.3 s) allows materials of high strength than originally used to be implemented in a repair, under the condition that they “satisfy the material and design requirements of the original code” it is intuitively obvious what is meant by the material requirements but the design requirements are unclear and a great many people think stronger is more better. But in the case of tubes in a fixed tube sheet heat exchanger or bolting on a custom body flange this is not necessarily the case, upgrading the bolts or tubes could introduce an unsafe overstressed condition in the adjacent materials unless calculations are conducted this will not be known. 3.4.4 g) could be used to indicate that the some material 'upgrades' need to be an alteration but as it refers back to 3.3.3 s) and the design requirement is not well defined it becomes hard to justify a material 'upgrade' as an alteration.

**Question 1:** 3.3.3 s) includes the following “provided the replacement material satisfies the material and design requirements of the original code of construction” it is clear that the material must be one permitted by the original code of construction but in referring to the “design requirements” is it the intent of the NBIC that when higher strength material are use the new material must not introduce an overstress situation?

**Reply 1:** Yes.

**Question 2:** If the above answer is no please remove 3.4.4 g) as it is superfluous or reword it to address changing to materials with lower allowable stresses specifically.

## PROPOSED INTERPRETATION

<b>Inquiry No.</b>	<b>19-62</b>
<b>Source</b>	John Siefert, EPRI
<b>Subject</b>	<p>Interpretation for using NBIC Part 3, 2.5.3.6 Welding Method 6 on Grade 92</p> <p><b>Background:</b> Most creep strength enhanced ferritic (CSEF) steels exist as Code Case materials. One such example is Grade 92 steel. This material still exists as a Code Case (2179), and it appears in some SA-specs, for example: SA-213 T92, SA-335 P92, SA-336 F92, and so forth. ASME B&amp;PV Code does not yet have a strategy or plan for the formal adoption of Code Case materials into the main body of the Code. In Code Case 2179-8 it states: “(c) For the purposes of procedure and performance qualifications, the material shall be considered P-No. 15E Group 1. The procedure and performance qualifications shall be conducted in accordance with Section IX.” There exist applications of Code Case 2179 in boiler tubing where the alternative weld repair methodology would be identical to that which is described in Welding Method 6. However, because of its Code Case status, it is not clear how to handle repairs for Code Case 2179 although the material is recognized as having similar welding characteristics and qualification rules in ASME Section IX.</p> <p><b>Explanation of Need:</b> End-users are experience failures in SA-213 T92 Code Case 2179 material and would like the option to invoke Welding Method 6 for repairs internal to the boiler setting.</p>
<b>Edition</b>	2019
<b>Question</b>	May Welding Method 6 also be used on CSEF steel which has been manufactured to the requirements in Code Case 2179, and otherwise classified as P No 15E Group 1?
<b>Reply</b>	<del>Yes</del> <u>No.</u>
<b>Committee’s Question</b>	
<b>Committee’s Reply</b>	
<b>Rationale</b>	

## Background for Requested Interpretation (Item 19-62) – ASME Code Case

Approval Date: June 28, 2012

Code Cases will remain available for use until annulled by the applicable Standards Committee.

### Case 2179-8

#### 9Cr-2W, UNS K92460 Material Section I; Section VIII, Division 1

*Inquiry:* May 9Cr-2W, UNS K92460 material conforming to one of the specifications listed in Table 1 be used for Section I and Section VIII, Division 1 construction?

*Reply:* It is the opinion of the Committee that 9Cr-2W, UNS K92460 material conforming to one of the specifications listed in Table 1 may be used for Section I and Section VIII, Division 1 construction, provided the following additional requirements are met:

(a) SA-369, FP92 material shall not exceed Brinell Hardness of 250 HBW/265 HV (25 HRC).

(b) The maximum allowable stress values, the tensile strength values, and the yield strength values for the material shall be those given in Tables 2 and 2M, 3 and 3M, 4 and 4M, respectively. The maximum use temperature for the material shall be 1,200°F (649°C).

(c) For the purposes of procedure and performance qualifications, the material shall be considered P-No. 15E Group 1. The procedure and performance qualifications shall be conducted in accordance with Section IX. Postweld heat treatment for this material is mandatory, and the following rules shall apply:

(1) The time requirements shall be those given for

calculated rather than measured, the formula used shall be reported. If requested, data supporting the validity of the formula shall be provided to the Manufacturer. All repair welds to base material shall be normalized and tempered according to the requirements of the applicable material product specification.

(f) Except as provided in (e), if during the manufacturing any portion of the component is heated to a temperature greater than 1,470°F (800°C), then the component must be reaustenitized and retempered in its entirety in accordance with the applicable material specification, or that portion of the component heated above 1,470°F (800°C), including the Heat-Affected Zone created by the local heating, must be replaced, or must be removed, reaustenitized, and retempered, and then replaced in the component.

(g) If the allowable stress values to be used are less than or equal to those provided in Table 1A of Section II, Part D for Grade 9 (SA-213 T9, SA-335 P9, or equivalent product specifications) at the design temperature, then the requirements of para. (e) may be waived, provided that the portion of the component heated to a temperature greater than 1,470°F (800°C) is reheat-treated within the temperature range 1,350°F to 1,425°F (730°C to 775°C). If this provision is exercised, it shall be noted on the Manufacturer's Data Report.

## Background for Requested Interpretation (Item 19-62) – ASME Section IX

**Table QW/QB-422  
Ferrous and Nonferrous P-Numbers  
Grouping of Base Metals for Qualification (Cont'd)**

Spec. No.	Type or Grade	UNS No.	Minimum Specified Tensile, ksi (MPa)	Welding		Brazing		ISO 15608 Group	Nominal Composition	Typical Product Form
				P-No.	Group No.	P-No.	Group			
Ferrous (Cont'd)										
A/SA-209	T1b	K11422	53 (365)	3	1	101	1.1	C-0.5Mo	Smls. tube	
A/SA-209	T1	K11522	55 (380)	3	1	101	1.1	C-0.5Mo	Smls. tube	
A/SA-209	T1a	K12023	60 (415)	3	1	101	1.1	C-0.5Mo	Smls. tube	
A/SA-210	A-1	K02707	60 (415)	1	1	101	11.1	C-Si	Smls. tube	
A/SA-210	C	K03501	70 (485)	1	2	101	11.1	C-Mn-Si	Smls. tube	
A211	A570-30	K02502	49 (340)	1	1	101	1.1	C	Welded pipe	
A211	A570-33	K02502	52 (360)	1	1	101	1.1	C	Welded pipe	
A211	A570-40	K02502	55 (380)	1	1	101	1.1	C	Welded pipe	
A/SA-213	T2	K11547	60 (415)	3	1	101	4.2	0.5Cr-0.5Mo	Smls. tube	
A/SA-213	T12	K11562	60 (415)	4	1	102	5.1	1Cr-0.5Mo	Smls. tube	
A/SA-213	T11	K11597	60 (415)	4	1	102	5.1	1.25Cr-0.5Mo-Si	Smls. tube	
A/SA-213	T17	K12047	60 (415)	10B	1	102	4.1	1Cr-V	Smls. tube	
A/SA-213	T22	K21590	60 (415)	5A	1	102	5.2	2.25Cr-1Mo	Smls. tube	
A/SA-213	T21	K31545	60 (415)	5A	1	102	5.2	3Cr-1Mo	Smls. tube	
A/SA-213	T5c	K41245	60 (415)	5B	1	102	5.3	5Cr-0.5Mo-Ti	Smls. tube	
A/SA-213	T5	K41545	60 (415)	5B	1	102	5.3	5Cr-0.5Mo	Smls. tube	
A/SA-213	T5b	K51545	60 (415)	5B	1	102	5.3	5Cr-0.5Mo-Si	Smls. tube	
A/SA-213	T91	K90901	85 (585)	15E	1	102	6.4	9Cr-1Mo-V	Smls. tube	
A/SA-213	T9	K90941	60 (415)	5B	1	102	5.4	9Cr-1Mo	Smls. tube	
A/SA-213	T92	K92460	90 (620)	15E	1	102	6.4	9Cr-2W	Smls. tube	
A/SA-213	TP201	S20100	95 (655)	8	3	102	8.3	17Cr-4Ni-6Mn	Smls. tube	
A/SA-213	TP202	S20200	90 (620)	8	3	102	8.3	18Cr-5Ni-9Mn	Smls. tube	
A/SA-213	XM-19	S20910	100 (690)	8	3	102	8.3	22Cr-13Ni-5Mn	Smls. tube	
A/SA-213	TP304	S30400	75 (515)	8	1	102	8.1	18Cr-8Ni	Smls. tube	
A/SA-213	TP304L	S30403	70 (485)	8	1	102	8.1	18Cr-8Ni	Smls. tube	
A/SA-213	TP304H	S30409	75 (515)	8	1	102	8.1	18Cr-8Ni	Smls. tube	
A/SA-213	...	S30432	86 (595)	8	1	102	8.1	18Cr-9Ni-3Cu-Cb-N	Smls. tube	
A/SA-213	TP304N	S30451	80 (550)	8	1	102	8.1	18Cr-8Ni-N	Smls. tube	
A/SA-213	TP304LN	S30453	75 (515)	8	1	102	8.1	18Cr-8Ni-N	Smls. tube	
A/SA-213	S30815	S30815	87 (600)	8	2	102	8.2	21Cr-11Ni-N	Smls. tube	
A/SA-213	TP309S	S30908	75 (515)	8	2	102	8.2	23Cr-12Ni	Smls. tube	
A/SA-213	TP309H	S30909	75 (515)	8	2	102	8.2	23Cr-12Ni	Smls. tube	
A/SA-213	TP309Cb	S30940	75 (515)	8	2	102	8.2	23Cr-12Ni-Cb	Smls. tube	
A/SA-213	TP309Hcb	S30941	75 (515)	8	2	102	8.2	23Cr-12Ni-Cb	Smls. tube	

Background for Requested Interpretation (Item 19-62) – NBIC Part 3, Welding Method 6

(19) **2.5.3.6 WELDING METHOD 6**

This welding method provides requirements for welding only Grade 91 tube material within the steam boiler setting. When using this welding method, the following applies:

- a) This method is limited to butt welds in tubing NPS 5 (DN 125) or less in diameter and ½ in. (13 mm) or less in wall thickness for which the applicable rules of the original code of construction did not require notch toughness testing;
- b) Application shall be limited to only boiler tube repairs at a location internal to the boiler setting;
- c) Upon the completion of weld repair, the repair area shall be kept above the dew point temperature so that condensation does not form on the repair surface before returned to service or a moisture-barrier coating shall be applied to the surface.

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51	SECTION 2
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NB-23	2019
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- 1) The material shall be limited to P-No 15E, Group 1, Grade 91, creep strength enhanced ferritic steel (CSEF).



## PROPOSED INTERPRETATION

<b>Inquiry No.</b>	<b>19-66</b>
<b>Source</b>	Jagadheesan Vellingiri Muthukumaraswamy, ABS Consulting
<b>Subject</b>	<p>Shell Side Heat Exchanger PWHT</p> <p><b>Background:</b> An R Certificate Holder is Doing Repair Work on the Shell Side of Heat Exchanger, which was not PWHT Earlier. As per Client Request, Welded Joints are Post weld Heat Treated and Consider as Alteration, Client wants Shell Side to Under Go Full Post weld Heat Treatment Including areas not repaired.</p> <p>NDE is being Carried out for Complete Equipment and Client wants PWHT for Welds which are in Services and without any repairs.</p>
<b>Edition</b>	2019; Part 3, 3.4 & 2.5.2
<b>Question</b>	<p>1. An R Certificate Holder is Doing Repair Work on the Shell Side of Heat Exchanger, which was not Post Welded Heat treated Earlier. As per Client Request, Repair Welded Joints are Post weld Heat Treated and Consider as Alteration as per 3.4, For Welded Joints not repaired Can Post weld Heat treatment be done and Responsibility can be Taken by R Certification and Considered Alteration?</p> <p><del>2. If R Stamp Holder Holds WPS for The Vessel with PWHT can that Post Weld Heat Treatment be carried out as per as per Approved WPS in order to meet Alteration requirement?</del></p>
<b>Reply</b>	<p>1. <del>No.</del> <u>This has been addressed in Interpretation 13-06.</u></p> <p>2. <del>Yes</del></p>
<b>Committee's Question</b>	
<b>Committee's Reply</b>	
<b>Rationale</b>	

**INTERPRETATION 13-06**

**Subject:** Part 3, 2.5.2

**Edition:** 2013

**Question 1:** An R-Certificate holder decides to perform post weld heat treatment (PWHT) of a vessel at the request of a client, where no PWHT was performed in the original construction. Is the performance of PWHT of the vessel considered an alteration and subject to documentation using a Form R2?

**Reply:** Yes.

**Question 2:** For the vessel described above, must the weld procedures used for construction of the vessel be qualified with PWHT?

**Reply:** Yes.

**Question 3:** Must the PWHT described above be performed by the R-Certificate holder?

**Reply:** No, the PWHT may be subcontracted; however the R certificate holder retains the responsibility for the performance of the PWHT.

PROPOSED INTERPRETATION – 19-67

<b>Inquiry No.</b>	<b>19-67</b>
<b>Source</b>	Doug Fowler, TUV AIA Services
<b>Subject</b>	Clarification of Part 3, 1.5.1 d) 1) <b>Background:</b> Manufacturers in non-jurisdictional states are making API-510 repairs or "non" code repairs to Code vessels when an NBIC rule is not convenient to an owner/customer. This should stop in my opinion. I interpret the statement in Part 3, 1.5.1 d) 1) to mean a stamp holder must do repairs or alterations to the NBIC. Clarification would be appreciated as the statement "as applicable" is ambiguous. .
<b>Edition</b>	2019; Part: Repairs and Alterations; Section: 1; Paragraph: 1.5.1 (d) (1)
<b>Question</b>	In Part 3 Section 1 Paragraph 1.5.1 (d) (1) it states: A statement that all repairs or alterations carried out by the organization shall meet the requirements of the NBIC and the Jurisdiction, as applicable.  Does the statement mean an organization holding an "R" stamp must do all repairs and organizations to the NBIC?
<b>Reply</b>	Yes
<b>Committee's Question</b>	<ol style="list-style-type: none"> <li>1. If an R-Certificate holder makes repairs <u>or alterations</u> to a pressure retaining item <u>installed</u> in a location where there is no Jurisdiction <u>or where the NBIC is not adopted</u>, are the repairs/<u>alterations</u> required to be made in accordance with the NBIC?</li> <li>2. If a <u>Form "R" Report</u> is completed and/or a Nameplate affixed/stamped for a repair <u>or alteration</u> to a pressure retaining item located where there is no Jurisdiction <u>or where the NBIC is not adopted</u>, is the R-Certificate holder required to make the repairs/<u>alterations</u> in accordance with the NBIC?</li> </ol>
<b>Committee's Reply</b>	<ol style="list-style-type: none"> <li>1. No.</li> <li>2. Yes.</li> </ol>

<b>Rationale</b>	<p>Question 1: d) Statement of Authority and Responsibility A dated <i>Statement of Authority and Responsibility</i>, signed by a senior management official of the organization, shall be included in the manual. Further, the <i>Statement</i> shall include:</p> <p>1) A statement that all repairs or alterations carried out by the organization shall meet the requirements of the NBIC and the Jurisdiction, as applicable;</p> <p>The NBIC states “the NBIC and Jurisdiction, as applicable. Since there are no Jurisdictional requirements, therefore, there are no NBIC requirements</p> <p>Question 2: The R Certificate Holder sign the R Form attesting that the repairs conform to the NBIC , _____ certify that to the best of my knowledge and belief the statements made in this report are correct and that all material, construction, and workmanship on this Repair conforms to the <i>National Board Inspection Code</i>. National Board</p>
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## PROPOSED INTERPRETATION

<b>Inquiry No.</b>	<b>19-86</b>
<b>Source</b>	Luis Ponce, National Board
<b>Subject</b>	<p>National Certified Pipe Welding Bureau (NCPWB) welding procedure specs</p> <p><b>Background:</b> Some ASME and National Board Certificate Holders have presented NCPWB procedures to Team Leaders (designees) at joint reviews as part of their welding demonstrations, and those companies may not understand the limited scope in which the procedures may be used.</p> <p>ASME Sect I, PW-28.5 used to read like B31.1, para 127.5.3. which states, “Each employer shall be responsible for qualifying any WPS that he/she intends to have used by personnel of his/her organization. However, to avoid duplication of effort, and subject to approval of the owner, a WPS qualified by a technically competent group or agency may be used if:</p> <p>(A.1) the group or agency qualifying the WPS meets all of the procedure qualification requirements of this Code,  (A.2) the fabricator accepts the WPS thus qualified,  (A.3) the user of the WPS has qualified at least one welder using the WPS, and  (A.4) the user of the WPS assumes specific responsibility for the procedure qualification work done for him/her by signing the records required by para. 127.6.</p> <p>However, PW-38.5 was removed in the 2009 Addenda to Section I and no longer exists in the Code, therefore the interpretation is no longer valid. Section VIII Div. 1 is silent on procedures “qualified by a technically competent group or agency.” Both Section I and VIII Div 1 require welding procedures to be qualified in accordance with Section IX. In conclusion, NCPWB WPSs may only be used for Code work on ASME B31.1 power piping and under no other ASME construction Code.</p>
<b>Edition</b>	2019; Part: Repairs and Alterations; Section: 2; Paragraph: 2.2 & 2.2.1
<b>Question</b>	<ol style="list-style-type: none"> <li>1. May an “R” certificate holder use a National Certified Pipe Welding Bureau (NCPWB) welding procedure for repairs and alterations of pressure retaining items consisting of pipe where ASME B31.1 is the construction Code?</li> <li>2. May an “R” certificate holder use a National Certified Pipe Welding Bureau (NCPWB) welding procedure for repairs and alterations of pressure retaining items consisting of pipe (as the shell or nozzles) where ASME Section I or Section VIII Div 1 is the construction Code?</li> </ol>
<b>Reply</b>	<ol style="list-style-type: none"> <li>1. Yes.</li> <li>2. No, because the NCPWB itself states the bureau operates exclusively under the scope of the ASME B31 Code for Pressure Piping, including B31.1 power piping.</li> </ol>
<b>Committee’s Question</b>	<ol style="list-style-type: none"> <li>1. May an “R” certificate holder use a National Certified Pipe Welding Bureau (NCPWB) welding procedure for repairs and alterations of pressure retaining items consisting of pipe where ASME B31.1 is the construction Code?</li> <li>2. May an “R” certificate holder use a National Certified Pipe Welding Bureau (NCPWB) welding procedure for repairs and alterations of pressure retaining items consisting of pipe (as the shell or nozzles) where ASME Section I or Section VIII Div 1 is the construction Code?</li> </ol>

<b>Committee's Reply</b>	<ol style="list-style-type: none"><li>1. Yes.</li><li>2. No.</li></ol>
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**NATIONAL CERTIFIED PIPE WELDING BUREAU**

*A Subsidiary of the Mechanical Contractors Association of America, Inc.*  
1385 Piccard Drive, Rockville, MD 20850-4340 Telephone (301) 869-5800: FAX (301) 990-9690



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December 1, 2019

Mr. Luis Ponce  
Manager of Technical Services  
National Board of Boiler and Pressure Vessel Inspectors  
1055 Crupper Avenue  
Columbus, Ohio 43229

Subject: NCPWB Welding Procedure Specifications

Dear Mr. Ponce

The following is in response to your letter of November 18 to the MSCA of Eastern PA.

The NCPWB is a membership organization founded in 1944 “to engage in research and educational work in the development of certified welding for the piping industry; to disseminate to its members, information and data relative to certified welding and to establish and qualify uniform procedures for pipe welding by appropriate methods; to provide for the interchange of records of qualified operators and to promote and develop the use and to maintain the quality of welding generally in the pipe fitting industry.” The NCPWB has largely achieved these goals with over 100 WPSs and thousands of welders across the country available for member contractors to put to work without having to qualify them themselves.

NCPWB operates exclusively under the scope of the ASME B31 Code for Pressure Piping. While the B31 Code Sections require qualification of WPSs and welders by each contractor in accordance with ASME Section IX, ASME B31.1 paragraph 127.5.3(a) takes exception to that requirement; it allows members of a technically competent group or agency to use WPSs qualified by that group or agency under specific conditions without qualifying themselves. Paragraph 127.5.3(b) also allows contractors to interchange welders without each contractor qualifying them.

With that background, NCPWB is a membership organization; contractors must be members to be permitted to use our WPSs. Access to our WPSs come with membership. These WPSs are not “prequalified” but are in full compliance with ASME Section IX, and supporting PQRs come with them. In order to adopt them, B31 specifies that contractors have to enter their company name on the WPS and PQRs and sign them, and they have to qualify one welder following each WPS. There is no need for contractors to requalify them when doing work under B31.1 or any other B31 Code Section.

As I’m sure you have gathered, NCPWB WPSs are only permitted for piping work in which one of the B31 code sections is applicable; they are not permitted to be used for ASME BPV Code or NBIC work except for Section I Boiler External Piping under PG-58.2 which says:

The materials, design, fabrication, installation, and testing shall be in accordance with ASME B31.1, Power Piping.

PG-109.1 also says:

When boiler external piping is installed by welding, the welding, including the qualification of welding procedures, welders, and welding operators, shall be done in accordance with the applicable rules of ASME B31.1.

Please contact me if you would like to discuss this further.

Regards,

Walter J. Sperko, P.E.  
NCPWB Technical Consultant

Address the writer in care of:  
Sperko Engineering Services  
4803 Archwood Drive  
Greensboro, NC 27406  
336-674-0600  
[sperko@asme.org](mailto:sperko@asme.org)  
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## PROPOSED INTERPRETATION

<b>Inquiry No.</b>	19-87 <b>NBIC Location: Part 3, 5.6</b>
<b>Source</b>	Robert Underwood
<b>Subject</b>	Form Registration Log <ul style="list-style-type: none"> <li>• Background: Many “R” (or “NR”?) Certificate Holders now use the National Board EDT system to register “R” Forms. All of the required log information in Paragraph 5.6 of Part 3 is available in EDT, therefore it is unnecessary and redundant for “R” Certificate Holders to maintain a separate log outside the EDT system.</li> </ul>
<b>Edition</b>	2019
<b>Question</b>	1. If an “R” Certificate Holder uses the EDT system to register repairs and alterations may the Form Registration Log requirement be waived?
<b>Reply</b>	1. Yes.
<b>Committee’s Question</b>	<p>1. Does an “R” or “NR” Certificate Holder exclusively using National Board Electronic Data Transfer system (EDT) for registration of Form “R” Reports meet the Form Registration Log requirements of Part 3, 5.6 of the NBIC?</p> <p><del>2. Must the Certificate Holder address the method of Form Registration Log documentation in their Quality Control Manual?</del></p>
<b>Committee’s Reply</b>	<p>1. Yes, <u>provided the Certificate Holder addresses the method of Form Registration Log documentation, access, and control in their Quality System Manual.</u></p> <p><del>2. Yes.</del></p>
	The National Board EDT system has all of the NBIC Part 3, 5.6 Form Registration Log requirement’s and can be accessed for review by all users. The EDT Home page states: the capability to meet the log requirements of <a href="#">NB-264, Criteria for Registration</a> for manufacturing organizations, and the requirements of the NBIC for Form Registration Logs for R Certificate Holders.
<b>SC Vote</b>	
<b>NBIC Vote</b>	
<b>Negative Vote Comments</b>	



## PROPOSED INTERPRETATION

<b>Inquiry No.</b>	<b>20-1</b>
<b>Source</b>	<b>Michael Coggan</b> , Boiler Inspector, Technical Inspection Services , <i>Justice and Public Safety</i> , Phone: 506-343-0327, E-mail: <a href="mailto:michael.coggan@gnb.ca">michael.coggan@gnb.ca</a>
<b>Subject</b>	NBIC Part 3, paragraph 3.3.2 <b>Background:</b> ASME B31.3 Normal Fluid Service and Severe Cyclic have mandatory requirements for radiography.
<b>Edition</b>	2019
<b>Question 1</b>	Are "Routine Repairs" permitted for ASME B31.3 Normal Fluid Service and Severe Cyclic piping?
<b>Proposed Reply 1</b>	No.
<b>Committee's Question 1</b>	For process piping classified as Normal Fluid Service and under Severe <del>Cycling</del> <u>Cyclic conditions service</u> in accordance with ASME B31.3 <u>Process Piping</u> , may routine weld repairs be performed in accordance with Part 3 of the NBIC?
<b>Committee's Reply 1</b>	<del>Yes, provided routine weld repairs have been described in the R-Certificate holders Quality System program and routine weld repairs have been accepted by the Inspector, and when required, by the Jurisdiction. Yes, provided the requirements of Part 3, 3.3.2 are met and routine weld repairs have been accepted by the Inspector, and when required, by the Jurisdiction.</del>
<b>Rationale 1</b>	
<b>Question 2</b>	Are "Routine Repairs" permitted for ASME B31.3 Category D Service piping?
<b>Proposed Reply 2</b>	Yes.
<b>Committee's Question 2</b>	<del>Are "Routine Repairs" permitted for ASME B31.3 Category D Service piping?</del>
<b>Committee's Reply 2</b>	<del>Yes, provided the requirements of Part 3, 3.3.2 are met and routine weld repairs have been accepted by the Inspector, and when required, by the Jurisdiction.</del>
<b>Rationale 2</b>	
<b>SC Vote</b>	
<b>NBIC Vote</b>	

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<b>Negative Vote Comments</b>	
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**PROPOSED INTERPRETATION**

<b>Inquiry No.</b>	<b>20-2</b>
<b>Source</b>	<b>Michael Ferry</b> , Curran International, Field Project Supervisor (Re-tube & Liners), +1 281 339 9993 Phone, "Mike Ferry" < <a href="mailto:mferry@curranintl.com">mferry@curranintl.com</a> >
<b>Subject</b>	NBIC Part 3, Table 2.3 – Latest 2018 AWS SWPS to be used in accordance with the 2019 NBIC for Repairs/Alterations  <b>Background:</b> Since Item 18-102 (updating the SWPS Table 2.3 in Part 3 to the current 2018 AWS standards – <a href="#">Attachment 1</a> ) was not passed by MC until after the 2019 was published, a number of SWPS's as listed in the 2019 Edition of the NBIC, Table 2.3 are not current.
<b>Edition</b>	2019
<b>Question</b>	Is it the intent of the NBIC to accept the use of the following Standard Welding Procedure Specifications for repairs and/or alterations in accordance with the 2019 NBIC? B2.1-1-016: 2018 B2.1-1-017: 2018 B2.1-1-019: 2018 B2.1-1-020: 2018 B2.1-1-021: 2018 B2.1-1-022: 2018 B2.1-8-023: 2018 B2.1-2-026: 2018 B2.1-1-027: 2018
<b>Proposed Reply</b>	Yes.
<b>Committee's Question</b>	
<b>Committee's Reply</b>	
<b>Rationale</b>	<u>Item 18-102 was approved by Main Committee for use of these 2018 SWPS's in the 2021 Edition of the NBIC. This Intent Interpretation Item would allow use of these SWPS's once approved.</u>
<b>SC Vote</b>	
<b>NBIC Vote</b>	
<b>Negative Vote Comments</b>	

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**ATTACHMENT 1 – Item 18-102 approved by Main Committee – To be published in 2021 Edition of the NBIC**

NB Item # 18-102 Update NBIC Part 3, Table 2.3 (01-16-2019)

Revise Table 2.3 adding the listed SWPSs that were revised by the AWS B2 Committee in 2018.

**PROPOSED REVISION**

**TABLE 2.3**

<u>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2) 1/8 inch [3 mm] through 1-1/2 inch [38 mm] Thick, E7018, in the As-Welded or PWHT Condition, Primarily Plate and Structural Applications.</u>	<u>B2.1-1-016: 2018</u>
<u>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2) 1/8 inch [3 mm] through 1-1/2 inch [38 mm] Thick, E6010, in the As-Welded or PWHT Condition, Primarily Plate and Structural Applications.</u>	<u>B2.1-1-017: 2018</u>
<u>Standard Welding Procedure Specification (SWPS) for CO<sub>2</sub> Shielded Flux Cored Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2) 1/8 inch [3 mm] through 1-1/2 inch [38 mm] Thick, E70T-1C and E71T-1C, in the As-Welded, Primarily Plate and Structural Applications.</u>	<u>B2.1-1-019: 2018</u>
<u>Standard Welding Procedure Specification (SWPS) for 75% Ar/25%CO<sub>2</sub> Shielded Flux Cored Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2) 1/8 inch [3 mm] through 1-1/2 inch [38 mm] Thick, E70T-1M and E71T-1M, in the As-Welded or PWHT Condition, Primarily Plate and Structural Applications.</u>	<u>B2.1-1-020: 2018</u>
<u>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Followed by Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2) 1/8 inch [3 mm] through 1-1/2 inch [38 mm] Thick, ER70S-2 and E7018, in the As-Welded or PWHT Condition, Primarily Plate and Structural Applications.</u>	<u>B2.1-1-021: 2018</u>
<u>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2) 1/8 inch [3 mm] through 1-1/2 inch [38 mm] Thick, E6010 (Vertical Uphill) Followed by E7018, in the As-Welded or PWHT Condition, Primarily Plate and Structural Applications.</u>	<u>B2.1-1-022: 2018</u>
<u>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Austenitic Stainless Steel (M-8/P-8, Group 1) 1/8 inch [3 mm] through 1-1/2 inch [38 mm] Thick, in the As-Welded Condition, Primarily Plate and Structural Applications.</u>	<u>B2.1-8-023: 2018</u>
<u>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2) 1/8 inch [3 mm] through 1-1/2 inch [38 mm] Thick, E6010 (Vertical Downhill) Followed by E7018, in the As-Welded or PWHT Condition, Primarily Plate and Structural Applications.</u>	<u>B2.1-2-026: 2018</u>
<u>Standard Welding Procedure Specification (SWPS) for Self-Shielded Flux Cored Arc Welding of Carbon Steel (M-1 or P-1, Groups 1 and 2), 1/8 inch [3 mm] through 1/2 inch [13 mm] Thick, E71T-11, in the As-Welded Condition, Primarily Plate and Structural Applications</u>	<u>B2.1-1-027:2018</u>

## PROPOSED INTERPRETATION

<b>Inquiry No.</b>	<b>20-3</b>
<b>Source</b>	Nathan Carter, Hartford Steam Boiler
<b>Subject</b>	<p>Inspector Involvement for Fitness-for-Service Assessments</p> <p><b>Background:</b> The below questions are intended to gain clarity as to first which Inspector (i.e. “IS” Commissioned or “R” Endorsement) signs the FFSA Form NB-403 when an “R” Certificate Holder is involved with a repair in that region as well as determine what level of review of the Fitness-for-Service the Inspector is expected to complete. If it is an Inspector holding a “R” Endorsement with an AI Commission (not tested on NBIC Part 2), shouldn’t the relevant pages in NBIC Part 2 concerning Fitness for Service be included in their tested body of knowledge, so they are aware of the detailed rules?</p>
<b>Edition</b>	2019; Part: Inspection & Repairs and Alterations; Section: 4 & 3; Paragraph: 4.4; Form NB-403; & 3.3.4.8
<b>Question</b>	<p>Question 1: In accordance with NBIC Part 3, 3.3.4.8, a fitness-for-service condition assessment as described in NBIC Part 2, 4.4 shall be completed and adequately documented on the FFSA Form NB-403. Once Form NB-403 is completed, is it required that the Inspector signing this Form hold a National Board “R” Endorsement as described in RCI-1/NB-263?</p> <p>Question 2: NBIC Part 2 4.4.1 d) states that the Inspector shall indicate acceptance of the Report of FFSA by signing. Paragraph 4.4.3 b) states that the Inspector shall review the condition assessment methodology and ensure that the inspection data and documentation are in accordance with Part 2. Is the Inspector’s signature on Form NB-403 an indication that the condition assessment and recommendations completed by the Engineer have been fully reviewed for appropriateness and accuracy by the Inspector?</p> <p>Question 3: If the answer to Question 2 is No, is the Inspector’s signature on Form NB-403 an indication of acceptance solely on the basis of review of the Form for completeness and verification that the requirements outlined in 4.4 were addressed?</p>
<b>Reply</b>	<p>Proposed Reply 1: Yes</p> <p>Proposed Reply 2: No</p> <p>Proposed Reply 3: Yes</p>
<b>Committee’s Question</b>	
<b>Committee’s Reply</b>	
<b>Rationale</b>	

**Item #:** NB15-1405

**Revision:** 1

**Date:** January 14, 2020

**Subject:** Clarification of Impact Testing Rules for Repairs

**Justification:**

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

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

**INSERT NEW PARAGRAPHS:**

**3.3.6 Pressure Vessel Impact Testing**

**3.3.6.1 Welding procedures used for repairs shall be qualified with impact testing when required by the original code of construction. The requirements for impact testing shall be in accordance with the rules of the original code of construction.**

**3.3.6.2 When the original code of construction requires the welding and testing of production impact test plates, the welding of production impact test plates shall be in accordance with the rules of the original code of construction. The production impact test plates shall be from the material in the vessel. When this is not practicable, the material may be from the same P-No and Group Number as the material being repaired.**

**3.3.6.3 The test material for the welding procedure qualification and for the production impact test plate 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  $CE = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$ ; elements are expressed in Weight Percent Amounts), but in no case shall the material be lower in strength.

**Item NB15-1405 (formally IN14-0401)**

The following is a history of record number NB15-1405, formally inquiry record 14-0401, found in NBIC committee Minutes from inception in 2014.

<p><b>January 2014</b> (see attachment "A")</p>	<p><b>Main Committee Minutes:</b> <b>IN14-0401 - Part 3, 1.2</b> - Question 1: The NBIC Part 3 paragraph 1.2 states that a repair shall be carried out "insofar as possible to the section and edition of the ASME code most applicable to the work planned." If a vessel is constructed using SA-517-E (P-11B) material to ASME Section VIII Div. 1, where production and weld procedure impact tests were required during construction, would a repair to a crack in the shell require production and weld procedure impact testing under the NBIC? Proposed Reply 1: Yes. (No attachment) Question 2: If the answer to Question 1 is yes and there was no SA-517-E material from the original lot available, would the repair require the addition of new base material (e.g. a flush patch around the area of the crack) so that production impact tests could be performed with the original base metal to the new base metal? Proposed Reply 1: Yes. Question 3: If the vessel described in Question 1 was to be altered by adding an SA-675 (P-1) pump flange to the shell, would production and weld procedure impact tests be required using the same lot P-1 and P-11B base materials as used in the alteration? Proposed Reply 1: Yes. <b>January 2014</b> A task group of Walt Sperko, Bob Wielgoszinski (PM), and George Galanes will work on this inquiry.</p> <p><b>SC RA Minutes:</b> <b>January 2014</b> Bob Wielgoszinski presented a document request for interpretation associated with welded repairs to UHT vessels. A task group of Walt Sperko, Bob Wielgoszinski (PM), and George Galanes will work on this inquiry.</p> <p><b>SG RA Specific Minutes:</b> <b>January 2014</b> Bob Wielgoszinski presented a document request for interpretation associated with welded repairs to UHT vessels. A task group of Walt Sperko, Bob Wielgoszinski (PM), and George Galanes will work on this inquiry.</p>
<p><b>January 2015</b> (see attachment "B")</p>	<p><b>Main Committee Minutes</b> <b>Item Number: IN14-0401 NBIC Location: Part 3, 1.2 Attachment Pages 72-73</b> <b>General Description:</b> Interpretation questions regarding requirements for production impact tests after repair or alteration of a vessel <b>Subgroup:</b> Repairs and Alterations <b>Task Group:</b> Unknown <b>Meeting Action:</b> Mr. Galanes gave a report. The Subcommittee on Repairs and Alterations voted unanimously close this interpretation with no response. The Subcommittee on Repairs and Alterations opened a new action item NB15-1405 to</p>



	<p>address production impact tests. Mr. Wielgoszinski explained the subject of the interpretation and the new action item. The NBIC Committee voted unanimously to close this interpretation with no response.</p> <p><b>SC RA Minutes:</b>  <b>January 2015</b>  Mr. Wielgoszinski provided a report. After consideration, Mr. Wielgoszinski decided to withdraw the inquiry and requested a new item to address impact testing of P11B material.  A motion was made to close this interpretation and open up an action Item.  The new action item will be:  <b>NB15-1405 Part 3-Impact testing of P-11B Material, SC R and A</b> (From IN14-0401)  A task group was formed with Bob Wielgoszinski, as project manager and member Ben Schaefer, Walt Sperko, Monty Bost, and Dave Ford. (Attachment Pages 8-9)</p>
<b>July 2015</b>	<b>No report. Not included on MC or RA agendas.</b>
<b>January 2016</b>	<b>No minutes available.</b>
<b>July 2016</b>	<b>No report. Not included on MC or RA agendas.</b>
<b>January 2017</b>	<b>No report. Not included on MC or RA agendas.</b>
<b>July 2017</b>	<b>No report. Not included on MC or RA agendas.</b>
<b>January 2018</b>	<b>No report. Not included on MC or RA agendas.</b>

## Request for Interpretation

Robert V. Wielgoszinski  
Hartford Steam Boiler of CT

<b>Item</b>	IN 14-0401
<b>Purpose</b>	Code Interpretation & possible revision to present Code rules
<b>Scope:</b>	Repairs and alterations to vessels constructed of ferritic materials with tensile properties enhanced by heat treatment, i.e. Part UHT material.
<b>Background</b>	<p>During the construction of liquid propane vessels it is typical to use SA-517 Gr. E (P-No. 11B) for use as heads and shells for propane transport tanks. The ASME Code requires the base materials, welding materials, and the WPS's to be qualified with impact tests. Also, the Code requires production impact testing to be performed. This is where the actual vessel material, actual filler materials, are welded with the actual WPS to be used in production, and the weld coupon is impact tested to meet the specified results of Section VIII. To do so, the Manufacturer of the vessel is sure to purchase enough extra base and filler material to perform these tests.</p> <p>When repairs / alterations are made to these vessels the NBIC requires the rules of the original construction Code to be followed. As such, any new material to be added to a vessel or any WPS's used or any filler metal used for the repair must then be impact tested and meet the results stated in Section VIII. Also, production impacts must therefore be made since this is a mandatory Section VIII requirement. This is usually accomplished by making a weld coupon out of existing material cut from the vessel and welding it to the new material to be added to the vessel, and then impact testing specimens from that coupon. But, not all repairs / alterations lend themselves the ability to take existing material from the vessel. If a small nozzle is added to the vessel, only a few inches of material is taken from the vessel. Or say a crack is to be weld repaired or there is weld metal build up to be made on some worn or wasted area. Then there is no extra material to be taken away from the vessel to run coupons for production impacts. Strict interpretation of the ASME Code would now require a piece of steel to be removed to run production impacts and then a flush patch installed over the area removed.</p> <p>Some individuals look at the words in NBIC, Part 3, Section 1, paragraph 1.2, where it says, "...the standard governing the original construction shall conform, <u>insofar as possible...</u>" gives one the leeway to not require production impacts because it's not possible. Others indicated that it is possible but not practical to cut perfectly good material out of a vessel when there is no need to. And others will say that the ASME clearly requires existing material to be removed to run impact tests. One thing is clear though, and that is there is lack of uniformity in applying these rules. So we are looking to the NBIC to provide some guidance in this matter. The Jurisdiction in this case is the US DOT, and 49CFR Chapter 1 § 180.413(a)(1) states that the NBIC is to be followed for repairs and modifications. DOT is also looking to the NBIC for clarification.</p>

	Depending on the responses to the inquiry it may be prudent revise the Code to be more specific in this area of UHT materials.
<b>Proposed Questions</b>	<p><b>Question 1:</b> The NBIC Part 3 paragraph 1.2 states that a repair shall be carried out “insofar as possible to the section and edition of the ASME code most applicable to the work planned.” If a vessel is constructed using SA-517-E (P-11B) material to ASME Section VIII Div. 1, where production and weld procedure impact tests were required during construction, would a repair to a crack in the shell require production and weld procedure impact testing under the NBIC?</p> <p><b>Proposed Reply 1:</b> Yes.</p> <p><b>Question 2:</b> If the answer to Question 1 is yes and there was no SA-517-E material from the original lot available, would the repair require the addition of new base material (e.g. a flush patch around the area of the crack) so that production impact tests could be performed with the original base metal to the new base metal?</p> <p><b>Proposed Reply 1:</b> Yes.</p> <p><b>Question 3:</b> If the vessel described in Question 1 was to be altered by adding an SA-675 (P-1) pump flange to the shell, would production and weld procedure impact tests be required using the same lot P-1 and P-11B base materials as used in the alteration?</p> <p><b>Proposed Reply 1:</b> Yes.</p>

**Attachment "B"**

This is the attachment that was included in the NBIC Minutes from the January 2015 meeting. It is identical to the original inquiry except for the new item number assigned as a revision.

## Action Item NB15-1405 from Request for Interpretation

Robert V. Wielgoszinski  
Hartford Steam Boiler of CT

<b>Item</b>	NB15-1405 (was IN 14-0401)
<b>Purpose</b>	Code interpretation & possible revision to present Code rules
<b>Scope:</b>	Repairs and alterations to vessels constructed of ferritic materials with tensile properties enhanced by heat treatment, i.e. Part UHT material.
<b>Background</b>	<p>During the construction of liquid propane vessels it is typical to use SA-517 Gr. E (P-No. 11B) for use as heads and shells for propane transport tanks. The ASME Code requires the base materials, welding materials, and the WPS's to be qualified with impact tests. Also, the Code requires production impact testing to be performed. This is where the actual vessel material, actual filler materials, are welded with the actual WPS to be used in production, and the weld coupon is impact tested to meet the specified results of Section VIII. To do so, the Manufacturer of the vessel is sure to purchase enough extra base and filler material to perform these tests.</p> <p>When repairs / alterations are made to these vessels the NBIC requires the rules of the original construction Code to be followed. As such, any new material to be added to a vessel or any WPS's used or any filler metal used for the repair must then be impact tested and meet the results stated in Section VIII. Also, production impacts must therefore be made since this is a mandatory Section VIII requirement. This is usually accomplished by making a weld coupon out of existing material cut from the vessel and welding it to the new material to be added to the vessel, and then impact testing specimens from that coupon. But, not all repairs / alterations lend themselves the ability to take existing material from the vessel. If a small nozzle is added to the vessel, only a few inches of material is taken from the vessel. Or say a crack is to be weld repaired or there is weld metal build up to be made on some worn or wasted area. Then there is no extra material to be taken away from the vessel to run coupons for production impacts. Strict interpretation of the ASME Code would now require a piece of steel to be removed to run production impacts and then a flush patch installed over the area removed.</p> <p>Some individuals look at the words in NBIC, Part 3, Section 1, paragraph 1.2, where it says, "...the standard governing the original construction shall conform, <u>insofar as possible...</u>" gives one the leeway to not require production impacts because it's not possible. Others indicated that it is possible but not practical to cut perfectly good material out of a vessel when there is no need to. And others will say that the ASME clearly requires existing material to be removed to run impact tests. One thing is clear though, and that is there is lack of uniformity in applying these rules. So we are looking to the NBIC to provide some guidance in this matter. The</p>

	<p>Jurisdiction in this case is the US DOT, and 49CFR Chapter 1 § 180.413(a)(1) states that the NBIC is to be followed for repairs and modifications. DOT is also looking to the NBIC for clarification.</p> <p>Depending on the responses to the inquiry it may be prudent revise the Code to be more specific in this area of UHT materials.</p>
<b>Proposed Questions</b>	<p><b>Question 1:</b> The NBIC Part 3 paragraph 1.2 states that a repair shall be carried out "insofar as possible to the section and edition of the ASME code most applicable to the work planned." If a vessel is constructed using SA-517-E (P-11B) material to ASME Section VIII Div. 1, where production and weld procedure impact tests were required during construction, would a repair to a crack in the shell require production and weld procedure impact testing under the NBIC? <b>Proposed Reply 1:</b> Yes.</p> <p><b>Question 2:</b> If the answer to Question 1 is yes and there was no SA-517-E material from the original lot available, would the repair require the addition of new base material (e.g. a flush patch around the area of the crack) so that production impact tests could be performed with the original base metal to the new base metal? <b>Proposed Reply 1:</b> Yes.</p> <p><b>Question 3:</b> If the vessel described in Question 1 was to be altered by adding an SA-675 (P-1) pump flange to the shell, would production and weld procedure impact tests be required using the same lot P-1 and P-11B base materials as used in the alteration? <b>Proposed Reply 1:</b> Yes.</p>

**NB16-1403** adds information on repair of high pressure vessels to Supplement 4 of Part 3. Due to the greater pressure, and resulting increased wall thicknesses, additional guidance was appropriate for pressure vessels with high design pressures, i.e. 1500 psi to 15000 psi, compared with vessels with design pressures from 200 psi to 1500 psi. Changes include identification of additional inspection tools, identifying minor defects and how to repair them so defects are mitigated and do not grow, how to confirm the repair is satisfactory, and identifying defects that are not repairable. A final hydrostatic proof test is required, and there shall be no delamination of the repaired area.

**PART 3  
SUPPLEMENT 4  
REPAIR AND ALTERATION OF FIBER-REINFORCED THERMOSETTING PLASTIC  
PRESSURE EQUIPMENT**

**S4.1 SCOPE**

...

**S4.2 INSPECTOR QUALIFICATIONS**

...

**S4.3 TOOLS**

The following tools may be required by the Inspector:

- a) adequate lighting including overall lighting and a portable lamp for close inspections;
- b) handheld magnifying glass;
- c) Barcol hardness tester;
- d) small pick or pen knife;
- e) small quantity of acetone and cotton swabs;
- f) camera with flash capability; ~~and~~
- g) liquid penetrant testing kit;
- h) depth and length gages; and
- i) metallic tap tester (e.g. quarter dollar).

**S4.4 LIMITATIONS**

...

**S4.5 REPAIR LIMITATIONS FOR FILAMENT WOUND VESSELS**

When the MAWP is greater than 200 psig (1.38 MPa), and less than 1500 psi (10.34 MPa) field repair of filament wound ASME Code Section X, Class I vessels shall be limited to corrosion barrier or liner repairs only, provided there is access to the vessel interior. ~~No structural repairs, re-rating, or alterations~~ are allowed for filament wound ASME Code Section X, Class 1 vessels that have an MAWP equal to or greater than 200 psig (1.38 MPa), 1500 psi (10.34 MPa) and Class III vessels in accordance with the requirements of S4.19.

**S4.6 VESSELS FABRICATED USING ELEVATED TEMPERATURE CURED RESIN SYSTEMS**

...

...

...

**S4.18 REPAIR AND ALTERATION METHODS**

**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, **are considered to be shall be defined** as Level 3 damage.

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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

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

**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 **are to** 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.

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#### 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 **must** shall extend at least 0.25 inch beyond the edge of the previous patch.

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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.

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#### 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 **the** 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.

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Item 17-137  
Part 3, S4.18.2.1 2) d. 2. and 4.

1) ...

2) Applying Test Patches to Verify Adequate Surface Preparation

- a. Test patches should be applied to any substrate that will require a secondary bond to determine the integrity of the primer bond prior to the application of the laminate.
- b. The subsequent steps shall be followed:
  1. Apply the primer (0,003 -0.005 in. (0.08 to 0.13 mm)) to the prepared surface, and allow primer to cure.
  2. Coat the primed surface with the same resin to be used in the laminate repair. Apply 4 in. (100 mm) x 14 in. (360 mm) piece of polyester, such as Mylar®, strip to one edge of primed area. Allow the polyester film to protrude from beneath the patch.
  3. Apply two layers of 1-1/2 oz/sq. ft (0.46 kg/sq. m) chopped strand mat saturated with the same resin that will be used for the repair. Mat shall be 12 in. (305 mm) x 12 in. (305 mm) square.
  4. Allow the mat layers to cure completely, this may be verified by checking the hardness of the laminate.
  5. Pry patch from surface using a screwdriver, chisel, or pry bar.
  6. A clean separation indicates a poor bond.
  7. Torn patch laminate or pulled substrate indicates that the bond is acceptable.
- c. If the bond is not adequate, go back to step a) and repeat the procedure.

**Note:** If the repair area is smaller than the test patch dimensions, decrease the test patch size accordingly.

- 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.

Part 3, S4.18.2.2 2)

- 1) ...
- 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.
- 3) Preparation of any surface requires that basic rules, common to all substrates, be followed. These rules are as outlined below:
  - a. Surface must be free of contaminants;
  - b. Surface must be structurally sound;
  - c. Surface must have adequate anchor pattern;
  - d. Surface must be dry;
  - e. Surface must be primed with recommended primer.

**Note:** After the surface has been properly prepared, it must be kept clean and dry until laminating can be started. Dust, moisture, or traces of oil that come in contact with the surface may act as a mold release or act to inhibit the cure and prevent a good secondary bond. Laminating should be done within two hours of the surface preparation.

17-137

1.) Remove the word **sand** in the abrasive blasting procedure. The NBIC should not be recommending a procedure that can give the blast operator silicosis. The phrase Abrasive blasting should be sufficient. That stills leaves the blasting company the option of using sand or whatever material desired.

2.) Make the thickness measures the same where they were supposed to be.

3.) Not to recommend a specific type primer with the removal of the word **epoxy**. There are multiple types of primers that can be tried. By removing epoxy it doesn't mean you can't use an epoxy primer.

**Subject** Code Revision to Part 3, 2.5.3.6  
**File Number** NB18-13 **Prop. on Pg.** 2

**Proposed  
Revision**

**Statement of  
Need** The revision is to add a new Welding Method 7 to allow for dissimilar metal welding of Grade 91 to austenitic steels and low alloy steels in a boiler setting and limited to butt welds, in accordance with approved welding method 6.

**Project Manager** John Siefert/G.  
Galanes

**SubGroup** **SG Meeting Date**  
**Negatives**

Background;

Welding Method 7 is being introduced to permit dissimilar metal weld repair with no PWHT between Grade 91 boiler tubes to austenitic steels and low alloy ferritic steels. This action permits DMW of Grade 91 tubes within the boiler setting following welding method 6 with no PWHT.

**Update for January 14, 2020.** The item was letter balloted at the subcommittee level and review+comment balloted at the main committee level. At the subcommittee level, the item passed with 11 approve and 1 disapprove. There were three separate editorial comments which are described below. At the main committee level there were 10 approve, 1 abstention and no comments.

The comments received at the subcommittee are addressed in the following 'rev 4' document. The comments were as follows:

1. Brian Boseo provided suggested a very minor edit to clarify 'and nickel alloys' in one of the subheadings. This has not been incorporated, but his suggestion to clarify the materials was taken into account and clarified in the rev 4 document by listing relevant P-Nos. A similar comment was raised by Ben Schaeffer.
2. Kathy Moore made two suggestions, all of which were addressed:
  - a. Consistent wording – tube material or tubing?
  - b. The values listed for the preheat and interpass temperatures in Fahrenheit and Celsius were different.
3. Ben Schaeffer made several suggestions, all of which were addressed:
  - a. I would very much like to see "nonpressure attachments" added to the list of acceptable uses
  - b. For the second arrangement 91 to P5A we may use GTAW (root and fill) or GTAW (root) with SMAW (fill). I don't believe we can use either of the

SMAW electrodes listed to root these welds. May I suggest rewording paragraph 2 to try and clarify this?

- c. In the very first paragraph you use the terminology "low alloy ferritic steel tubing" which I believe is intended to mean P5A, can we match up this specific reference to the second arrangement where we are talking about P5A tubing to kind of close the loop.

In addition to these comments, the redundancy has been removed and consolidated to make the requirements and verbiage mirror Welding Method 5 or Welding Method 6 where appropriate.

**Update for January 15, 2020.** It was suggested to clarify verbiage in proposed 2.5.3.7 d) "...and to non-pressure part welds..."

**NB Item 18-13**

**2.5.3.7 WELDING METHOD 7**

When using this welding method, the following applies:

- a) This welding method may be used when the applicable rules of the original code of construction or the construction standard or code selected permit joining dissimilar materials.
- b) The materials shall be limited to ASME P-No. 15E, Group 1 joined to either P-No. 5A or P-No. 8, P-No. 42, P-No. 43 or P-No. 45, as permitted for welded construction by the applicable rules of the original code of construction.
- c) The welding shall be limited to the SMAW and/or GTAW processes, manual or automatic, using suitably controlled maintenance procedures to avoid contamination by hydrogen producing sources. The surface of the metal shall be free of contaminants and kept dry.
- d) This method is limited to butt welds in tubing NPS 5 (DN 125) or less in diameter and ½ in. (13 mm) or less in wall thickness and to non-pressure part welds for which the applicable rules of the original code of construction did not require notch toughness testing.
- e) Application shall be limited to a location internal to the boiler setting.
- f) Upon the completion of weld repair, the repair area shall be kept above the dew point temperature so that condensation does not form on the repair surface before returned to service or a moisture-barrier coating shall be applied to the surface.
- g) Qualification thickness limits of base metal and weld deposit thickness shall be in accordance with ASME Section IX, QW-451.
- h) The welding procedure qualification test coupon shall be ASME P-No. 15 E, Group 1, joined to either P-No. 5A, P-No. 8, P-No. 42, P-No. 43, or P-No. 45.
- i) The Welding Procedure Specification (WPS) shall be qualified in accordance with the requirements of ASME Section IX. No postweld heat treatment shall be applied to the test coupon. Additionally, the WPS shall include the following requirements:
  - 1) The minimum preheat for the GTAW process shall be 200°F (93°C). The minimum preheat for the SMAW process shall be

**Comment [SJ1]:** This section clearly indicates which materials are acceptable. (Ben Schaeffer Comment 3).

Reference to 'austenitic stainless steel' or 'nickel-base alloy' or 'nickel alloy' is removed or not included as this is redundant. (Brian Boseo Comment 1)

**Comment [SJ2]:** This clearly indicates that GTAW and/or SMAW are permitted to allow for GTAW root and SMAW fill. (Ben Schaeffer Comment 2)

**Comment [SJ3]:** This is the only reference to 'tubing.' All other references to 'tube' or 'tubing' have been removed. (Kathy Moore Comment 1)

**Comment [SJ4]:** Clarification raised by Walt Sperko during SG-RA meeting

**Comment [SJ5]:** This allows for welds between tubes and attachments (a common repair scenario) per Ben Schaeffer Comment 1

300°F (149°C). The maximum interpass temperature shall be 550°F (288°C). The preheat temperature shall be checked to ensure the minimum preheat temperature is maintained during welding and until welding is completed.

**Comment [SJ6]:** These values have been changed to reflect proper conversions. (Kathy Moore Comment 2)

- 2) When the SMAW process is specified for a fill pass layer, the electrode diameter is restricted to a maximum size of 1/8 in. (3.2 mm). When the GTAW-process is specified any limits in filler size is to be shown on the WPS.
- 3) Regardless of the welding process, only the use of stringer beads shall be permitted.
- 4) For the joining of ASME P-No. 15E, Group 1 to P-No. 5A, the filler metal shall be limited to a martensitic, iron-base filler metal to those assigned to F-No. 4 or F-No. 6 in ASME Section IX, QW-432 and limited to the following consumables: E8015-B8, E8018-B8 or ER80S-B8.
- 5) For the joining of ASME P-No. 15E, Group 1 to P-No. 8, P-No. 42, P-No. 43 or P-No. 45, the filler metal shall be limited to an austenitic, nickel-base filler metal to those assigned to F-No. 43 in ASME Section IX, QW-432 and limited to the following consumables: ERNiCr-3, ENiCrFe-3, ENiCrFe-2, ASME B&PV Code Cases 2733 and 2734.

**Comment [SJ7]:** This section clearly indicates which materials are acceptable and which filler material(s) are allowed. (Ben Schaeffer Comment 3)

**Comment [SJ8]:** This section clearly indicates which materials are acceptable and which filler material(s) are allowed. (Ben Schaeffer Comment 3)

## NBIC ACTION ITEM 18-65:

### **Proposed new sub-paragraphs – 1/10/19**

#### 3.2.1

- ~~c) Use of replacement material that has previously been in service or considered as used material may be permitted if deemed acceptable by the “R” Certificate Holder, the Inspector and, when required, the Jurisdiction. This material shall conform insofar as possible to the requirements of the original code of construction or construction standard, or code selected, and the NBIC. Material of this nature shall be given an initial visual inspection for verification of similar construction, and at a minimum meet all Code requirements of material(s) to be replaced, e.g; size, chemical, physical, minimum thickness, along with consideration of replacement material history of service, and be provided with original supporting documentation attesting to such.~~
- ~~d) Where original supporting documentation cannot be provided or is not available, the proposed replacement material shall be verified as being acceptable for use by the “R” Certificate Holder, along with Inspector concurrence, prior to installation. Such verification, at a minimum, shall consist of initial visual inspection along with laboratory analysis (chemical, physical, minimum thickness), and may be supplemented using one or a combination of the examination and test methods shown in Part 3 Section 4, paragraph 4.4.1 (for repairs) or 4.4.2 (for alterations).~~

### Proposed Rev. 1 of new sub-paragraph – 1/14/20

#### 3.2.1

- ~~c) Use of replacement material or Parts that has have previously been in service or considered as used material may be permitted if deemed acceptable by the “R” Certificate Holder, the Inspector, and if required, the Jurisdiction. This material shall conform insofar as possible to the original code of construction or construction standard, or code selected, and the NBIC. Consideration shall be given to the condition of replacement material that has previously been used, including its service history, prior to acceptance. Material/Parts that have been in time dependent service shall not be permitted as replacement material/Parts without evaluation for exposure time.~~



**323.1.4 Reclaimed Materials.** Reclaimed pipe and other piping components may be used, provided they are properly identified as conforming to a listed or published specification ([para. 323.1.1](#) or [323.1.2](#)) and otherwise meet the requirements of this Code. Sufficient cleaning and inspection shall be made to determine minimum wall thickness and freedom from imperfections that would be unacceptable in the intended service.

# PART 3, SECTION 11 REPAIRS AND ALTERATIONS — INDEX

## A

### Acceptance

(Foreword), (1.3.1), (1.3.2), (1.5.1), (1.6.6.2), (1.6.7.2), (1.6.8.2), (1.6.9), (2.5.3), (3.2.6), (3.2.7), (3.3.4.8), (3.3.5.2), (3.4.5.1), (4.1), (4.4), (5.2.1), (5.2.2), (5.7.2), (5.8.1), ~~(5.12.4.1)~~, ~~(5.12.5.1)~~, ~~(5.12.6.1)~~, (S2.11), (S4.2), (S4.12), (S4.16.3), (S4.17.3), (S4.18.2), (S4.18.2.1), (S6.10.2), (S6.11), (S6.14), (S6.15.1), (S6.16.2), (S6.18), (S8.1), (8.2), (9.1)

### Access Opening

(3.3.4.3)

### Accreditation

(Introduction), (1.1), (1.4.1), (1.6.1), (1.6.6.1), (S6.4), (9.1)

#### Programs

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### Acoustic Emission

(S4.13), (S4.14), (S4.15), (S4.17.6), (S4.18.2.5), (S5.2), (S5.6.2)

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### Additional Requirements for Repairs

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(3.2.6), (3.4), (3.4.4), (3.4.5), (3.4.5.1), (4.1), (4.2), (4.4), (4.4.2), (5.1), (5.2), (5.2.2), (5.4), (5.5), (5.5.2), (5.5.3), (5.5.5), (5.7), (5.7.1), (5.7.3), (5.7.5), (5.8), (5.8.2), (5.9), ~~(5.12)~~, ~~(5.12.2)~~, ~~(5.12.4.1)~~, ~~(5.12.5.1)~~, (S1.1.1), (S1.2.6.1), (S1.2.6.2), (S1.2.6.3), (S1.2.8), (S1.2.9.2), (S1.2.10), (S1.2.11), (S1.2.11.2), (S1.1.12.1), (S2.1), (S2.2), (S2.4), (S2.5), (S2.11), (S2.12), (S2.13.9), (S2.13.9.3), (S2.13.9.4), (S2.13.10), (S3.1), (S3.2), (S3.4), (S3.5.2.3) (S4.1), (S4.5), (S4.6), (S4.7), (S4.8), (S4.12), (S4.13), (S4.14.3), (S4.17), (S4.17.1), (S4.17.2), (S4.17.3), (S4.17.4), (S4.17.6), (S4.18), (S4.18.1), (S4.18.2), (S4.18.2.5), (S2.18.6), (S5.1), (S5.7.1), (S5.7.2), (S6.1), (S6.3), (S6.4), (S6.5), (S6.7), (S6.8.1), (S6.10.3), (S6.11), (S6.14), (S6.15), (S6.15.1), (S6.16.1), (S6.16.4), (S6.17), (S6.17.1), (S6.17.4), (S6.17.5), (S6.18), (S6.18.3), (S6.19), (S6.20), (S6.20.1), (S6.20.2), (S6.20.3), (S7.1), (S7.2), (S7.4), (S7.6), (7.1), (7.2), (9.1)

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### American National Standards Institute (ANSI)

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### ASME Code

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(S1.2.12.1), (S3.2), (S3.5.4), (S4.5), (S4.6), (S4.7),  
(S4.17.4), (S4.17.5), (S6.3), (S6.6), (S6.10),  
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#### **Audit**

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#### **Authority**

(1.2), (1.5.1), (1.6.2.1), (1.6.3), (1.6.4), (1.6.6.2),  
(1.6.7.2), (1.6.8.1), (1.6.8.2), (1.6.9), (S4.15),  
(S4.17.6), (S6.3), (S6.8), (S6.8.1), (S6.10.2),  
(S6.10.3), (S6.11), (S6.15), (S6.15.1), (S6.17.5),  
(S6.18), (S6.18.1), (S6.20), (9.1)

#### **Authorization**

(Foreword), (1.5.1), (1.6.1), (1.6.2), (1.6.3), (1.6.4),  
(1.6.5), (1.6.6.1), (1.6.7.1), (1.6.8.1), (3.2.2),  
(5.7.1), (5.7.5), (5.8), ~~(5.12.1)~~, ~~(5.12.4.1)~~, ~~(5.12.5)~~,  
~~(5.12.5.1)~~, ~~(5.12.6.1)~~, (S3.2), (S4.1), (S4.9),  
(S4.16.3), (S4.17.3), (S6.6), (S6.7), (S6.8.1),  
(S6.15), (S6.15.1), (S6.17.5), (S6.20), (9.1)

#### **Authorized Inspection Agency (AIA)**

(1.3), (1.4.2), (1.5.1), (3.3.5.2), (3.4.5.1), (5.3),  
(5.4), (S2.8), (S3.2), (S6.8), (S6.16.3), (9.1)

#### **Authorized Nuclear Inservice Inspector (ANII)**

(1.6.9)

#### **Authorized Nuclear Inspection Agency (ANIA)**

(1.6.3), (1.6.4), (1.6.6.2), (1.6.7.2), (1.6.8.2),  
(1.6.9)

#### **Authorized Nuclear Inspector Supervisor (ANIS)**

(1.6.6.2), (1.6.7.2), (1.6.8.2), (S9.2)

#### **Authorized Nuclear Inspector (ANI)**

(1.6.6.2), (1.6.7.2), (1.6.8.2), (1.6.9), ~~(5.12.5.1)~~,  
(5.13.6.1)

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#### **Barcol Hardness Test**

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#### **Barrel Pins**

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#### **Firetube**

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## **Braces**

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#### **Calculations**

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(3.4.1), (3.4.2), (S1.1.4), (S4.6), (S4.16.3),  
(S4.17.2), (S4.17.3), (S4.17.4), (S4.17.5),  
(S4.18.2.3), (S4.18.2.4), (7.3), (7.4), (8.4)

#### **Calibration**

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**Certificate Holder**

(1.2), (1.3.1), (1.4.1), (1.4.2), (1.5.1), (1.6.5), (1.6.6.2), (1.6.7.2), (1.6.8.2), (1.6.9), (2.2.2), (2.2.4), (2.2.5), (2.2.6.1), (3.2.1), (3.2.2), (3.2.4), (3.3.2), (3.3.4.9), (3.4.1), (3.4.2), (3.4.5.1), (4.2), (4.4), (5.2), (5.2.1), (5.2.2), (5.4), (5.5), (5.6), (5.7.1), (5.7.2), (5.7.3), (5.7.5), (5.7.5), (5.8), ~~(5.12.4)~~, ~~(5.12.4.1)~~, ~~(5.12.5.1)~~, ~~(5.12.6.1)~~, (S1.1.1), (S3.2), (S3.5.4.1), (S4.7), (S4.8), (S4.10.3), (S7.4), (S4.15), (S4.16.3), (S4.16.4), (S4.17.2), (S4.17.5), (S4.17.6), (S4.18.2.1), (S4.18.2.2), (S6.3), (S6.5), (S6.8), (S6.9), (S6.9.2), (S6.9.4), (S6.9.5), (S6.10.3), (S6.11), (S6.15), (S6.15.1), (S6.16.2), (S6.18), (S6.19), (S6.20.2), (S7.6), (9.1)

**Certificate of Authorization**

(Introduction), (1.4.1), (1.4.2), (1.5), (1.5.1), (1.6.1), (1.6.2), (1.6.3), (1.6.4), (1.6.5), (1.6.7.1), (1.6.8.1), (3.2.2), (5.7.5), ~~(5.12.4.1)~~, ~~(5.12.5.1)~~, ~~(5.12.6.1)~~, (S3.2), (S4.1), (S4.9), (S6.6), (S6.8.1), (S6.15.1), (S6.20), (9.1)

**Certificate of Compliance**

(1.6.7.2), ~~(5.12.1)~~, ~~(5.12.2)~~, ~~(5.12.3)~~, ~~(5.12.4.1)~~, ~~(5.12.5)~~, ~~(5.12.6)~~

**Certification**

(1.3), (1.5.1), (1.6.2), (1.6.6.2), (1.6.7.2), (2.3), (3.2.2), (3.3.5.2), (3.4.5.1), (4.2), (5.1), (5.2.2), ~~(5.12.2)~~, (S3.2), (S4.9), (S4.16.3), (S4.17.3), (S6.6), (S6.8), (S6.11), (S7.6)

**Certified Material Test Report (CMTR)**

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**Certifying Engineer**

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**Code Interpretation**

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**Code of Construction**

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**Codes and Standards**

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**Commissioned Inspector**

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**Construction Code**

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**Construction Standards**

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(3.3.2), (3.3.3), (3.3.4.3), (3.4.2), (4.4.1), (4.4.2),  
(S2.13.9.2), (S2.13.9.5), (S2.13.12.2), (S4.5),  
(S4.6), (S4.12), (S4.16.4), (S4.18.1), (S4.18.2),  
(S4.18.2.1), (S4.18.2.2), (S4.18.2.3), (S4.18.2.7),  
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## Cracks

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(S2.13), (S2.13.9.2), (S2.13.9.4), (S2.13.10.2),  
(S2.13.11.2), (S2.13.12.2), (S2.13.13.5), (S3.2),  
(S3.5.1), (S4.12), (S4.18.2.1), (S4.18.2.2),  
(S4.18.2.4), (S5.6.2)

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### Data Report

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(3.3.4.1), (3.3.4.2), (3.3.4.6), (3.3.4.8), (3.3.4.9),  
~~(5.12.5.1)~~, ~~(5.12.6.1)~~, (S1.2.9.2), (S1.2.10),  
(S1.2.11.4), (S1.2.12.2), (S2.13)

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(3.2.4), (3.2.5), (3.3.4.3), (3.3.5.2), (3.4.2),  
(3.4.5.1), (5.2.2), (5.4), ~~(5.12.2)~~, ~~(5.12.4.1)~~,  
~~(5.12.5.1)~~, ~~(5.12.6.1)~~, (S2.4), (S2.13.9.5), (S4.6),  
(S4.15), (S4.16.3), (S4.17.2), (S4.17.3), (S4.17.4),  
(S4.17.5), (S4.17.6), (S4.18.2.1), (S4.18.2.2),  
(S4.18.2.4), (S4.18.2.5), (S5.3.1), (S5.4), (S6.8.1),  
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**Heat Treatment**

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**Hold Time**

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**Hot Tapping**

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**Hydrogen**

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**Hydrophilic Solvent**

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**Hydrostatic Test**

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**Identification Mark**

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**Impervious**

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**Impregnated**

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**Insulation**

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**Internal**

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**Jaeger Type No. 1**

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**Jurisdiction**

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**Jurisdictional Authority**

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**Jurisdictional Requirements**

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(S3.3), (S4.16.4)

**Notch Toughness**  
(2.5.3.1), (2.5.3.2), (2.5.3.3), (2.5.3.4), (2.5.3.5),  
(3.4.1), (4.4.1), (4.4.2), (S5.6.1)

**Nuclear Items**  
(1.1), (1.6.1), (1.6.9), (5.13.5)

**Nuclear Valves**  
(5.7.5), ~~(5-12.6)~~

## O

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**Operating Parameters (Yankee Dryers)**  
(S5.6.1), (S5.6.2)

**Orifices**  
(S8.4)

**Overheating**

(3.3.4.2)

**Overlay**

(3.2.1), (3.3.2), (3.3.3), (3.3.4.3), (S4.18.2.4), (S4.18.2.5)

**Owner**

(1.4.1), (1.6.3), (1.6.6.1), (1.6.6.2), (1.6.7.1), (1.6.7.2), (1.6.8.1), (1.6.9), (1.6.8.2), (3.3.4.3), (3.3.4.9), (4.4.1), (4.4.2), (5.3), (5.12.4.1), (5.12.5.1), (5.12.6.1), (S2.3), (S2.12), (S3.2), (S4.15), (S4.17.6), (S4.18.2.1), (S6.16.3), (S6.18.1), (S6.20)

**Owner-User**

(Introduction), (5.4), (S1.1.1), (S5.5), (S6.20)

**Owner-User Inspection Organization**

(Introduction), (1.3), (3.3.5.2), (3.4.4.1)

**P****Partial Penetration Weld**

(2.5.2), (S1.2.9.2)

**Patch Bolts**

(S1.2.6.1), (S1.2.8), (S2.13.6)

**Patches**

(3.3.3), (3.3.4.1), (3.3.4.2), (3.3.4.3), (3.3.4.6), (S1.2.1), (S1.2.6.1), (S1.2.8), (S1.2.10), (S1.2.11.1), (S1.2.11.2), (S1.2.11.3), (S1.2.11.4), (S1.2.11.5), (S1.2.11.6), (S2.13), (S2.13.1), (S2.13.6), (S2.13.9.1), (S2.13.9.2), (S2.13.9.3), (S2.13.9.4), (S2.13.10.3), (S2.13.10.4), (S2.13.11.1), (S2.13.11.2), (S2.13.11.3), (S2.13.12.2), (S2.13.12.3), (S2.13.14.1), (S2.13.14.2), (S2.13.14.3), (S4.18.2.1), (S4.18.2.2), (S4.18.2.4)

**Performance Qualification**

(2.2.3), (2.2.4), (2.2.6), (2.4), (2.5.3), (S4.10.2), (S4.10.5), (S6.9.3), (S6.9.4), (S6.9.6)

**Personnel Safety**

(Foreword), (Introduction), (S2.3), (7.2)

**Piecing**

(3.3.4.5)

**Pipe/Piping**

(1.2), (1.6.7.2), (2.3), (2.5.2), (2.5.3), (3.2.2), (3.2.6), (3.3.2), (3.3.4.5), (5.12.4.1), (5.12.5.1), (5.12.6.1), (S1.1.3.1), (S1.2.13.1), (S2.7.1), (S2.13.14.1), (S6.6), (7.4)

**Pit**

(3.3.4.2), (S1.2.11.4), (S2.13.10.4), (S4.12)

**Plug**

(S1.1.3.1), (S1.2.12.2), (S2.7.1), (S2.13.14.3), (S3.3), (S3.3.4.9), (S3.5.2.3), (S3.5.2.4), (S3.5.3), (S3.5.3.1), (S3.5.3.2), (S3.5.4), (S5.5), (S5.6.3), (S5.6.4)

**Plug Stitching**

(S3.5.2.3), (S3.5.3), (S3.5.3.1), (S3.5.3.2)

**Pneumatic Testing**

(4.4.1), (4.4.2), (5.12.5.1), (5.12.6.1), (S4.15), (S4.17.6), (S6.8.1), (S6.18.1), (9.1)

**Portable Tank (DOT)**

(S6.20)

**Postweld Heat Treatment**

(1.5.1), (2.5.2), (2.5.3), (2.5.3.1), (2.5.3.6), (3.2.1), (3.3.2), (3.3.4.3), (S1.2.10), (S1.2.11.2), (S2.10), (S2.13), (S2.13.9.2), (2.13.9.3), (S6.10.2), (S6.10.3), (S8.2)

**Precision Bores**

(S4.18.2), (S4.18.2.2)

**Preheating**

(2.5.1), (2.5.3), (2.5.3.1), (2.5.3.2), (2.5.3.3), (2.5.3.4), (2.5.3.6), (3.2.1), (S1.2.10), (S2.10), (S2.13), (S2.13.9.2), (S6.10.1)

**Preparation of Forms**

(5.2.1), (5.2.2), (S6.19)

**Pressure Control**

(S8.3)

**Pressure Gages**

(4.3), (S4.13.1), (S6.13)

**Pressure Relief Devices**

(Organization), (Foreword), (1.1), (1.6.2), (1.6.9), (4.4.1), (4.4.2), (5.12.6), (5.12.6.1), (S4.15), (S4.17.6), (S6.18.1)

**Pressure-Retaining**

(Foreword), (Introduction), (1.1), (1.2), (1.3), (1.3.1), (1.4), (1.4.1), (1.5.1), (2.1), (2.2), (2.5.2), (2.5.3), (2.5.3.2), (2.5.3.4), (2.5.3.5), (3.1), (3.2.1), (3.2.6), (3.2.7), (3.3.1), (3.3.2), (3.3.3), (3.3.4.3), (3.3.4.8), (3.4.1), (3.4.2), (3.4.4), (4.1), (4.2), (4.4), (4.4.1), (4.4.2), (5.1), (5.2.1), (5.2.2), (5.4), (5.5.2), (5.7.1), (5.7.2), (5.7.3), (5.7.5), (5.8.1), (5.9), (5.12.4.1),

(S1.1.3), (S1.1.3.1), (S2.7), (S2.7.1), (S2.13),  
(S3.2), (S3.3), (S4.1), (S4.7), (S4.10), (S4.12),  
(S4.15), (S4.16.1), (S4.16.3), (S4.16.4), (S4.17.1),  
(S4.17.3), (S4.17.5), (S4.18.2.6), (S5.3), (S5.3.1),  
(S5.4), (S5.5), (S5.6.1), (S5.6.2), (S5.7.1), (S5.7.2),  
(S6.15), (S6.15.1), (S6.17.1), (S6.17.3), (S6.17.5),  
(S6.18), (S6.18.1), (S7.4)

## Pressure Testing

### Alterations

(1.3.2), (3.4.1), (3.4.2), (4.4.2), (S3.4),  
(S4.17.6), (S6.8.1)

### FRP Vessels

(S4.13), (S4.15), (S4.18.2.4), (S4.18.2.5)

### Parts

(4.5.4)

### Repairs

(1.3.2), (3.2.2), (4.4.1), (S2.8), (S3.2),  
(S3.5.4), (S4.13), (S4.15), (S4.18.2.4),  
(S4.18.2.5), (S6.8.1), (S6.18.1)

## Pressure Vessels

(Foreword), (2.5.3), (2.5.3.2), (2.5.3.4), (3.3.3),  
(3.3.5), (3.3.5.1), (3.3.5.2), (3.4.4), (3.4.5), (3.4.5.1),  
(5.2.2), ~~(5.12.4.1)~~, (S3.2), (S4.6), (S4.16.3),  
(S4.17.3), (S4.17.4), (S4.17.5), (S6.9), (S6.11),  
(S7.1), (9.1)

## Plastic

(1.5.1), (5.7.5), ~~(5.12.4.1)~~, (S4.1), (S4.2), (S4.17.5),  
(S4.18.2), (S4.18.2.7)

## Procedure Qualification

(2.2.2), (2.2.4), (2.5.3.2), (2.5.3.3), (2.5.3.4),  
(2.5.3.6), (S3.2), (S4.10.1), (S4.10.3), (S6.9.2),  
(S6.9.4), (S8.4)

## Provisions for Expansion/Support

(S1.2.3), (S1.2.5), (S1.2.6.3), (S1.2.10), (S2.13)

## Q

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## Qualifications

### Engineer

(3.3.5.2), (3.4.5.1), (S4.6), (S4.16.3),  
(S4.17.3), (S4.17.4)

### FRP Performance

(S4.10.2)

### Inspector

(S4.2)

### Lift Assist

(4.5.3)

### NDE

(1.6.6.2), (1.6.7.2), (S2.11), (4.2), (S4.12),  
(S6.11)

## Secondary Bond

(S4.10.2), (S4.10.3), (S4.10.5)

## Welding

(1.5.1), (2.2.2), (2.2.3), (2.2.4), (2.2.6),  
(2.2.6.1), (2.4), (2.5.3), (2.5.3.2), (2.5.3.3),  
(2.5.3.4), (2.5.3.5), (2.5.3.6), (S2.9),  
(S6.9.3), (S6.9.4), (S6.9.6), (8.4)

## Quality Records

(1.6.7.2)

## Quality Systems

(Introduction), (1.4.1), (1.4.2), (1.5), (1.5.1),  
(1.6.7.2), (2.2.6.1), (3.3.2), (4.2), (5.2), (5.5.2),  
(S3.5.4), (S4.16.4), (S6.11)

## R

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### “R” Certificate Holder

(1.2), (1.3.1), (1.5.1), (2.2.2), (2.2.4), (2.2.5),  
(2.2.6.1), (3.2.1), (3.2.2), (3.2.4), (3.3.2), (3.3.4.9),  
(3.4.1), (3.4.2), (3.4.3), (3.4.5.1), (4.2), (4.4), (5.2),  
(5.2.1), (5.2.2), (5.4), (5.5), (5.6), (5.7.1), (5.7.3),  
~~(5.12.4.1)~~, (S1.1.1), (S3.2), (S4.2), (S4.7), (S7.6)

### “R” Symbol Stamp

(1.4.1), (1.4.2), (1.5.1), (3.2.2), (3.3.4.8), (5.5.3),  
(5.5.5), (5.7.5), (5.10), (S2.6), (S3.2), (S3.4), (S4.9),  
(S4.14.3)

## Radiography

(1.6.6.2), (1.6.7.2), (2.5.3), (S1.2.9.4), (S1.2.9.5),  
(S1.2.10), (S1.2.11.2), (S1.2.11.5), (S2.13.9.2),  
(S2.13.9.3), (S2.13.10.3), (S2.13.11.2), (S2.13.11.3),  
(S2.13.14.1), (S5.6.2), (S7.4)

## Records Review

(3.4.1), (S2.12), (S3.2), (S3.3), (S4.10.3), (S4.17.5),  
(S6.5), (S7.4)

## Re-Ending

(3.3.4.5), (S1.2.9.1), (S2.13.7)

## Reference to Other Codes and Standards

(1.2), (3.2.6), (S4.7), (S6.3), (S6.10.3)

## Registration of “R” Forms

(5.5), (5.5.1), (5.5.2), (5.6), ~~(5.12.1)~~, ~~(5.12.2)~~, (S6.4),  
(S6.19.2)

## Removal of Stamping

(5.11), (S6.15.1)

## Reinforced Thermoplastic

(S4.2), (S4.18.2), (S4.18.2.7)

## Reinforced Thermosetting Plastic

(1.6.1), (S4.1)

## Renewal

(1.4.1), (1.6.3), (1.6.5)

## Repair Guide

(S3.5), (S5.4)

## Repair Organization

(Introduction), (1.1), (1.3.1), (1.5.1), (1.6.6), (2.3), (S1.1.3), (S2.7), (S2.8), (S2.9), (S3.2), (S3.5.1), (S6.8.1), (S6.20), (S6.20.1)

## Replacement Parts

(1.6.6.2), (1.6.7.2), (1.6.8.2), (1.6.9), (3.1), (3.2.2), (3.3.2), (3.3.3), (3.3.4.9), (3.4.4), (4.4), (4.4.1), (4.4.2), ~~(5.12.1)~~, ~~(5.12.2)~~, ~~(5.12.5)~~, ~~(5.12.5.1)~~, ~~(5.12.6)~~, ~~(5.12.6.1)~~, (S1.2.4), (S1.2.9.3), (S1.2.12.1), (S2.7.2), (S2.13.3), (S2.13.5), (S2.13.9.5), (S2.13.14.4), (S3.2), (S3.3), (S3.5.4), (S4.9), (S4.15), (S4.17.6), (S5.3.1), (S5.7.2), (S6.6), (S6.18)

## Replacement Stamping

(5.11), (S6.15.1)

## Replacement Valves

(3.3.2), (5.7.5)

## Report Forms

(1.3.2), (1.5.1), (S4.14), ~~(5.12.1)~~, ~~(5.12.2)~~, ~~5.12.3~~, ~~(5.12.3)~~, ~~(5.12.4)~~, ~~(5.12.5)~~, ~~(5.13.6)~~

## Request

(Foreword), (Introduction), (1.4.1), (1.6.4), (1.6.7.2), (8.1), (8.3), (8.4), (8.5)

## Re-rating

(3.4.1), (3.4.2), (5.2.2), (5.4), (5.7.1), (5.7.3), (5.7.5), ~~(5.12.4.1)~~, (S2.13.9.5), (S4.5), (S4.6), (S4.17.5), (S6.15)

## Re-Rolling

(S1.2.9.6)

## Resin

(S3.1), (S3.5.4), (S4.6), (S4.8), (S4.11), (S4.12), (S4.18.2.1), (S4.18.2.2)

## Responsibility

(Foreword), (Introduction), (1.5.1), (1.6.5), (1.6.6.2), (1.6.7.2), (1.6.8.2), (2.3), (5.2.1), (5.2.2), (5.3), (5.4), (5.7.3), (S3.2), (S6.20)

## Return of Stamp

(1.4.2)

## Review

(1.3.2), (1.4.1), (1.5), (1.6.4), (1.6.5), (1.6.6.2), (1.6.7.2), (1.6.8.2), (1.6.9), (3.2.5), (3.2.6), (3.3.4.8), (3.3.4.9), (3.3.5.2), (3.4.1), (3.4.5.1), (5.2.2), ~~(5.12.4.1)~~, (S3.2), (S3.3), (S4.14), (S4.16.3), (S4.17.3), (S4.17.4), (S4.18.2.3), (S4.18.2.6), (S5.4), (S5.7.2), (7.3)

## Revisions

(Foreword), (Introduction), (1.5.1), (1.6.6.2), (1.6.7.2), (1.6.8.2), (2.3), (3.4.5.1), ~~(5.12.5.1)~~, (S4.6), (8.1), (8.2), (8.3), (8.4)

## Risk-Based Inspection

(Introduction), (3.3.4.8)

## Rivets/Riveted Joints

(3.3.3), (3.3.4.2), (3.3.4.4), (3.3.4.6), (S1.1.3), (S1.1.3.1), (S1.1.4), (S1.2.2), (S1.2.6), (S1.2.6.1), (S1.2.6.2), (S1.2.6.3), (S1.2.8), (S1.2.10), (S1.2.11.1), (S1.2.11.2), (S1.2.11.3), (S1.2.11.5), (S1.2.12.1), (S2.1), (S2.7.1), (S2.13), (S2.13.2), (S2.13.9.1), (S2.13.9.2), (S2.13.9.3), (S2.13.9.4), (S2.13.10.1), (S2.13.10.3), (S2.13.10.4), (S2.13.11.3), (S2.13.12.3), (S2.13.13.1), (S2.13.13.2), (S2.13.13.3), (S2.13.13.4), (S2.13.13.5), (S2.13.14.1)

## Routine Repairs

(1.3.1), (3.3.2), (4.4.1), (5.7.2), (5.8.1), ~~(5.12.4.1)~~, (S3.3), (S4.16.3), (S4.16.4)

## S

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### Safety

(Foreword), (Introduction), (3.3.4.8), (S2.3), (7.2)

### Scale and Sludge

(2.5.3.2), (2.5.3.3), (2.5.3.4)

### Scope of Activities (Accreditation)

(Introduction), (1.4.1)

### Seal Welding

(3.3.3), (3.3.4.4), (S1.2.3), (S1.2.4), (S1.2.7), (S1.2.8), (S1.2.9.2), (S1.2.9.6), (S1.2.9.7), (S1.2.9.8), (S1.2.12.1), (S1.2.12.2), (S2.13.3), (S2.13.5), (S2.13.6), (S2.13.8), (S2.13.13.5), (S2.13.14.1)

**Seams**

(3.3.3), (3.3.4.6), (S1.2.10), (S1.2.11.1), (S1.2.11.2), (S1.2.11.5), (S1.2.12.1), (S2.13), (S2.13.9.2), (S2.13.9.3), (S2.13.9.4), (S2.13.10.3), (S2.13.11.3), (S2.13.13.1), (S2.13.13.5), (S4.18.2.8)

**Secondary Bonding**

(S4.2), (S4.4.), (S4.8), (S4.9), (S4.10), (S4.10.1), (S4.10.2), (S4.10.3), (S4.10.4), (S4.10.5), (S4.12), (S4.14), (S4.17.6), (S4.18.2.1), (S4.18.2.2), (S4.18.2.4)

**Service Conditions**

(1.2), (2.5.3), (3.3.4.8), (3.4.1), (3.4.2), (S3.2), (S4.17.5)

**Set Pressure**

(4.4.1), (4.4.2), (5.7.5), ~~(5.12.6)~~, ~~(5.12.6.1)~~, (S4.15), (S4.17.6), (S6.18.1)

**Shipping and Transporting**

(1.6.6.2), (1.6.7.2), (1.6.8.2), (S6.10.3)

**Shop**

(1.4.1), (S1.1.4), (S3.2), (S3.5.1), (S4.9), (S6.6), (9.1)

**Siphon (Thermic)**

(S1.2.9), (S1.2.9.4)

**Sleeve**

(S1.1.3.1), (S1.2.3), (S1.2.5), (S3.5.4)

**Soak Band (SB)**

(2.5.2)

**Specifications**

(1.2), (1.5.1), (1.6.6.2), (1.6.7.2), (2.2.1), (2.2.2), (2.2.3), (2.2.6), (2.2.6.1), (2.3), (2.4), (2.5.1), (2.5.3.1), (2.5.3.2), (2.5.3.3), (2.5.3.4), (2.5.3.6), (3.2.1), (3.2.4), (3.3.4.2), (3.3.5.2), (3.4.5.1), (4.4.1), (4.4.2), ~~(5.12.4.1)~~, ~~(5.12.5.1)~~, (S1.1.3.1), (S2.7.1), (S2.9), (S2.10), (S3.2), (S3.3), (S4.2), (S4.7), (S4.10.1), (S4.10.5), (S4.16.3), (S4.17.2), (S4.17.3), (S4.18.2.2), (S4.18.2.4), (S4.18.2.7), (S4.18.2.8), (S5.4), (S5.6.3), (S6.3), (S6.5), (S6.6), (S6.9.1), (S6.9.2), (S6.9.3), (S6.9.6), (S6.10.1), (S6.10.3)

**Stamping**

(Introduction), (1.3.2), (1.6.6.2), (1.6.9), (3.3.2), (5.1), (5.7.1), (5.7.2), (5.7.3), (5.7.4), (5.7.5), (5.8), (5.8.1), (5.8.2), (5.9), (5.10), (5.11), (S3.2), (S3.4), (S4.14.1), (S4.16.4), (S5.5), (S6.9.5), (S6.15), (S6.15.1), (S7.6), (7.1)

**Standard Welding Procedures**

(1.5.1), (2.2.2), (2.2.3), (2.3), (S2.9), (S6.9.2), (S6.9.3)

**Stays/Staybolts**

(3.3.4.2), (3.3.4.3), (3.3.4.6), (3.3.4.7), (S1.1.3.1), (S1.2.1), (S1.2.2), (S1.2.3), (S1.2.4), (S1.2.5), (S1.2.5.1), (S1.2.6), (S1.2.6.1), (S1.2.6.2), (S1.2.6.3), (S1.2.10), (S1.2.11.1), (S1.2.11.2), (S1.2.11.3), (S1.2.11.5), (S2.7.1), (S2.13.1), (S2.13.2), (S2.13.3), (S2.13.4), (S2.13.9.5), (S2.13.10.1), (S2.13.10.2), (S2.13.10.3), (S2.13.10.4), (S2.13.11.3), (S2.13.12.2), (S2.13.12.3), (S2.13.13.2), (S2.13.14.1), (S5.3.1)

**Stayed Surfaces**

(S1.2.11.2), (S2.13.10.3)

**Storage Methods**

(S2.1)

**Stress Corrosion Cracking (SCC)**

(2.5.3)

**Structural Attachments**

(S4.6), (S4.13)

**Structural Steel**

(S6.12)

**Superheaters**

(S1.1.3.1)

**Superimposed Back Pressure (BP)**

~~(5.12.2)~~

**Supports**

(Introduction), (1.6.6.2), (3.3.3), (5.7.5), (S1.2.8), (S4.18.2.5)

**Surface Preparation**

(3.2.1), (S4.8), (S4.18.2.1), (S4.18.2.2), (S4.18.2.3), (S4.18.2.4), (S4.18.2.5), (S4.18.2.6), (S4.18.2.7), (S4.18.2.8), (S7.12)

**Surfaces (FRP)**

(S4.6), (S4.12), (S4.18.2.1), (S4.18.2.2), (S4.18.2.3), (S4.18.2.4), (S4.18.2.5), (S4.18.2.6), (S4.18.2.7), (S4.18.2.8)

**T****Technical Inquiries**

(8.1)

**Telltale Holes**

(S1.2.2), (S1.2.5), (S1.2.6.1), (S1.2.6.3), (S2.13.4)

**Temper Bead**

(2.5.3), (2.5.3.2), (2.5.3.3), (2.5.3.4), (2.5.3.5),  
(S2.10)

**Test Only**

~~(5.12.4)~~

**Testing**

(Introduction), (1.6.6.2), (1.6.7.2), (1.6.8.2), (2.2.3),  
(2.5.3.1), (2.5.3.2), (2.5.3.3), (2.5.3.4), (2.5.3.5),  
(2.5.3.6), (3.2.1), (3.3.4.2), (3.4.1), (3.4.2), (4.1),  
(4.2), (4.3), (4.4), (4.4.1), (4.4.2), (1.8), 1.6~~(5.12.4.1)~~,  
~~(5.12.5.1)~~, ~~(5.12.6.1)~~, (S2.8), (S3.5.4), (S4.3),  
(S4.15), (S4.17.6), (S5.2), (S5.6.2), (S6.9.3),  
(S6.11), (S6.18.1), (S7.5), (S8.4), (7.1), (8.4)

**Thermic Siphon**

(S1.2.9), (S1.2.9.4)

**Thermoplastic Repairs**

(S4.2), (S4.18.2), (S4.18.2.7)

**Thinning**

(3.3.4.3), (S5.4), (S5.6.1)

**Threaded Connections**

(S1.2.12.2)

**Threaded Opening**

(S1.2.12.2), (S2.13.14.1), (S2.13.14.3)

**Threaded Stays, Bolts, Studs**

(3.3.4.2), (3.3.4.3), (3.3.4.7), (S1.1.3.1), (S1.2.1),  
(S1.2.2), (S1.2.3), (S1.2.4), (S1.2.5), (S1.2.7),  
(S2.13.1), (S2.13.2), (S2.13.3), (S2.13.4), (S2.13.5),  
(S2.13.10.1), (S2.13.10.2)

**Ton Tanks (DOT)**

(S6.5), (S6.20)

**Training**

(1.6.6.2), (1.6.7.2), (1.6.8.2), (4.2), (S2.3), (S6.8.1)

**Transient**

(1.2), (9.1)

**Transport Tanks**

(Introduction), (1.2), (S6.1), (S6.7), (S6.8.1),  
(S6.10.3), (S6.15.1), (S6.17.1), (S6.18), (S6.18.1),  
(7.1), (9.1)

**Tube Segments**

(S3.2)

**Tubes**

(2.5.3.6), (3.2.2), (3.3.2), (3.3.3), (3.3.4.2), (3.3.4.3),  
(3.3.4.4), (3.3.4.5), (3.3.4.6), (3.3.4.9), ~~(5.12.4.1)~~,  
(S1.1.3.1), (S1.2.9), (S1.2.9.1), (S1.2.9.2),  
(S1.2.9.3), (S1.2.9.5), (S1.2.9.6), (S1.2.9.7),  
(S1.2.11.2), (S1.2.11.5), (S1.2.13.1), (S2.7.1),  
(S2.13), (S2.13.7), (S2.13.8), (S2.13.10.3),  
(S2.13.11.3), (S2.13.12.1), (S2.13.12.2),  
(S2.13.12.3), (S2.13.14.1), (S3.2), (S3.3), (S3.5.4),  
(S6.6), (S7.6)

**Tubesheet**

(3.2.2), (3.3.3), (3.5.7), (S1.2.6), (S1.2.9.4),  
(S1.2.11.5), (S1.2.11.6), (S2.13.11.1.), (S2.13.11.2),  
(S2.13.11.3), (S2.13.12.1), (S2.13.12.2),  
(S2.13.12.3), (S3.5.1), (S3.5.4)

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**U****Ultrasonic Examination**

(3.3.4.2), (3.3.4.3), (S5.6.2), (S7.4)

**Unique Identifier**

(2.2.5), (5.6), ~~(5.12.4.1)~~, (S4.10.4), (S5.6.1), (S6.9.5)

**Units of Measurement**

(Introduction), (2.3), ~~(5.12.4.1)~~, (7.1), (7.2), (7.3),  
(7.4)

**Unstayed Areas**

(3.3.4.2), (3.3.4.3), (S1.2.9.4), (S1.2.10),  
(S2.13.9.1), (S2.13.9.2), (S2.13.9.3), (S2.13.9.4)

**User**

(Introduction), (1.3), (1.4.1), (2.1), (2.3), (3.2.6),  
(3.3.5.2), (3.4.5.1), (5.3), (5.4), (S1.1.1), (S2.1),  
(S2.2), (S2.3), (S3.2), (S4.16.3), (S4.17.3), (S5.4),  
(S5.5), (S6.16.3), (S7.8), (8.1), (8.5), (9.1)

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**V****Vacuum Test**

(4.4.1), (S3.5.4), (S4.15), (S4.17.6)

**Valves**

(1.1), (1.2), (1.4.1), (1.6.6.2), (3.3.2), (4.4.1), (4.4.2),  
(5.7.5), ~~(5.12.5.1)~~, ~~(5.12.6.1)~~, (S1.2.13.1), (S6.18.1)

**Verification**

(1.5.1), (1.6.4), (1.6.6.2), (1.6.7.2), (1.6.8.2), (1.6.9),  
(9.1)

**Visual Acuity**

(4.4.1), (S4.2)

**Visual Examination**

(3.3.2), (3.4.3), (4.4.1), (4.4.2), (S4.2), (S4.12), (S6.8.1)

**“VR” Authorization**

(Introduction), (1.1)

**“VR” Certificate Holder**

(9.1)

**“VR” Certificate of Authorization**

~~(5.12.6.1)~~

**“VR” Stamp**

~~(5.12.6)~~

**W**

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**Wasted Areas**

(3.3.2), (3.3.3), (3.3.4.2), (3.3.4.3), (S2.13.9.1), (S2.13.10.1), (S2.13.11.1), (S2.13.12.1), (S2.13.14.2)

**Water Column**

(S1.2.13.1)

**Water Gage Connection**

(S1.2.13.1)

**Water Gage Glass**

(S1.2.13.1)

**Waterside**

(3.3.4.9), (S1.2.11.2), (S1.2.11.3), (S1.2.11.4), (S2.13.9.3), (S2.13.10.4)

**Weld Buildup**

(3.3.2), (3.3.3), (3.3.4.3), (S1.2.3), (S1.2.6.1), (S1.2.10), (S1.2.11.3), (S1.2.11.4), (S1.2.11.5), (S1.2.11.6), (S1.2.12.2), (S2.13), (S2.13.9.1), (S2.13.10.1), (S2.13.10.4), (S2.13.11.1), (S2.13.12.1), (S2.13.14.1), (S2.13.14.2), (S2.13.14.3)

**Welder**

(1.5.1), (2.2.3), (2.2.5), (2.2.6), (2.2.6.1), (2.5.3)

**Welders Continuity**

(2.2.6), (S6.9.6)

**Welders Identification**

(2.2.5), (S6.9.5), (S7.12.5)

**Welding**

(1.4.1), (1.5.1), (1.6.6.2), (1.6.7.2), (1.6.8.2), (2.1), (2.2), (2.2.1), (2.2.2), (2.2.3), (2.2.4), (2.2.5), (2.2.6), (2.2.6.1), (2.3), (2.4), (2.5.1), (2.5.3), (2.5.3.1), (2.5.3.2), (2.5.3.3), (2.5.3.4), (2.5.3.5), (2.5.3.6), (3.2.1), (3.2.2), (3.3.2), (3.3.3), (3.3.4.2), (3.3.4.3), (3.3.4.4), (3.3.4.6), (3.3.4.9), (3.4.3), (5.7.5), ~~5.12.3(5.12.3), (5.12.4.1), (5.12.5.1), (5.12.6.1)~~, (S1.1.2), (S1.1.3), (S1.2.1), (S1.2.3), (S1.2.4), (S1.2.6), (S1.2.6.1), (S1.2.6.2), (S1.2.6.3), (S1.2.8), (S1.2.9.1), (S1.2.9.2), (S1.2.9.6), (S1.2.9.7), (S1.2.10), (S1.2.11.1), (S1.2.11.2), (S1.2.11.3), (S1.2.11.4), (S1.2.11.5), (S1.2.11.6), (S1.2.12.1), (S1.2.12.2), (S2.7), (S8.1), (S8.2), (S8.3), (S8.4), (S8.5)

**Welding Methods**

(2.5.3.1), (2.5.3.2), (2.5.3.3), (2.5.3.4), (2.5.3.5), (2.5.3.6)

**Welding Operator**

(1.5.1), (2.2.3), (2.2.5), (2.2.6), (S6.8.1), (S6.9.3), (S6.9.5), (S6.9.6)

**Welding Procedures**

(2.2.1), (2.2.2), (S8.4)

**Welding Records**

(2.2.4), (S6.9.4)

**Weld Repair**

(3.3.3), (3.3.4.3), (3.3.4.8), (4.2), (S1.2.9.4), (S8.1), (S8.2), (S8.3), (S8.4), (S8.5)

**Wrapper Sheet**

(S1.2.3), (S1.2.11.5)

**X**

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**Y**

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**Yankee Dryers**

(5.9), (S5.1), (S5.2), (S5.3), (S5.4), (S5.5), (S5.6), (S5.7)

**Z**

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## PART 3, SECTION 5 REPAIRS AND ALTERATIONS — CERTIFICATION/DOCUMENTATION AND STAMPING

### 5.1 SCOPE

This section provides requirements for certification, stamping, and documentation of repairs and alterations to pressure-retaining items. Applicable forms are provided in this section for reference. Forms may be obtained from the National Board website.

### (19) 5.2 DOCUMENTATION

- a) Repairs that have been performed in accordance with the NBIC shall be documented on a Form R-1, *Report of Repair*, as shown in Supplement S9.2 ~~this section~~. A Form R-4, *Report Supplement Sheet*, as shown in Supplement S9.5, shall be used as needed to record additional data when the space provided on Form R-1 is not sufficient.
- b) Alterations performed in accordance with the NBIC shall be documented on a Form R-2, *Report of Alteration*, as shown in Supplement S9.3 ~~this section~~. A Form R-4, *Report Supplement Sheet*, as shown in Supplement S9.5, shall be used as needed to record additional data when the space provided on Form R-2 is not sufficient.
- c) The organization performing repairs and alterations shall retain a copy of the completed Form “R” Report on file and all records and documentation substantiating the summary of work as described throughout Section 5, and as identified in the “R” Certificate Holder’s Quality System Manual.

(19)

### 5.2.1 PREPARATION OF FORM R-1 REPORT OF REPAIR

- a) Using the instructions found ~~at NBIC Part 3, 5.12.4.1~~ in Table S9.2 of Supplement 9, preparation of Form R-1 shall be the responsibility of the “R” Certificate Holder performing the repair.
- b) Information describing the scope of work used to repair a pressure-retaining item (PRI) shall be documented on a Form R-1 and extended to a Form R-4 as needed to fully describe the repair activities completed per the instructions ~~at NBIC Part 3, 5.12.4.1~~ in Table S9.2 of Supplement 9.
- c) An Inspector shall indicate acceptance by signing Form R-1, and Form R-4, if attached.
- d) The Form R-3, *Report of Parts Fabricated by Welding*, Manufacturer’s Data Reports, and Certificates of Compliance described in this section shall be a part of the completed Form R-1 and shall be attached thereto.

(19)

### 5.2.2 PREPARATION OF FORM R-2 REPORT OF ALTERATION

- a) Using the instructions found ~~at NBIC Part 3, 5.12.4.2, Initial~~ in Table S9.3 of Supplement 9, ~~initial~~ preparation of Form R-2 shall be the responsibility of the “R” Certificate Holder responsible for the design portion of the alteration. The design organization shall complete and sign the “Design Certification” section of the Form R-2. An Inspector shall indicate acceptance of the design by signing the “Certificate of Design Change Review” section of the Form R-2.
- b) The information describing an alteration to a pressure-retaining item shall be identified on Form R-2 with a complete description of the scope of work for physical or non-physical changes. When the scope of work represents a change that will increase the Minimum Required Relieving Capacity (MRRC) of a pressure-retaining item, such as a change in heating surface, Maximum Designed Steaming Capacity (MDSC), or BTU/hr (W) heating capacity, the new MRRC shall be documented on Form R-2 and indicated on the appropriate nameplate of NBIC Part 3, Figure 5.7.5-b or NBIC Part 3, Figure 5.7.5-c.



- c) Final preparation of Form R-2, including gathering and attaching supporting reports, shall be the responsibility of the “R” Certificate Holder that performed the construction portion of the alteration. The construction organization shall complete the Form R-2 provided by the design organization, including the “Construction Certification” section of the form. An Inspector shall indicate that the work complies with the applicable requirements of this code by completing and signing the “Certificate of Inspection” section of the form. When no construction work is performed (e.g., a re-rating with no physical changes), the “R” Certificate Holder responsible for the design shall prepare the Form R-2, including gathering and attaching of supporting documentation.
- d) The following shall be attached to and become a part of completed Form R-2:
  - 1) For ASME boilers and pressure vessels, a copy of the original Manufacturer’s Data Report, when available;
  - 2) Form R-3, Report of Parts Fabricated by Welding, Manufacturer’s Partial Data Reports, or Certificates of Compliance, if applicable; and
  - 3) For other than ASME, the manufacturer’s reports (i.e., reports required by the original code of construction, etc.), when available.

**5.2.3 PREPARATION OF FORM R-3 REPORT OF PARTS FABRICATED BY WELDING (19)**

Using the instructions found [at NBIC Part 3, 5.12.4.3 in Table S9.4 of Supplement 9](#), preparation of Form R-3 shall be the responsibility of the “R” Certificate Holder responsible for performing the work.

**5.2.4 PREPARATION OF FORM R-4 REPORT SUPPLEMENT SHEET (19)**

Using the instructions found [at NBIC Part 3, 5.12.4.4 in Table S9.5 of Supplement 9](#), preparation of Form R-4 shall be the responsibility of the “R” Certificate Holder responsible for performing the work.

**5.3 DISTRIBUTION OF FORM R-1**

- a) Legible copies of completed Form R-1, together with attachments, shall be distributed to the owner or user and Jurisdiction, if required, and shall be provided to the Inspector and the inservice Authorized Inspection Agency of the pressure retaining item upon request.
- b) Distribution of Form R-1 and attachments shall be the responsibility of the organization performing the repair.

**5.4 DISTRIBUTION OF FORM R-2**

- a) Distribution of completed Form R-2 shall be the responsibility of the “R” Certificate Holder who performed the construction portion of the alteration. When no construction work is performed (e.g., a re-rating with no physical changes), the “R” Certificate Holder responsible for the design shall distribute the form.
- b) Legible copies of the completed Form R-2, together with attachments, shall be distributed to the owner-user, the “R” Certificate Holder responsible for design, and the Jurisdiction, if required, and shall be provided to the Inspector and inservice Authorized Inspection Agency of the pressure retaining item upon request.

**5.5 REGISTRATION OF FORMS — GENERAL**

- a) When registration of the forms are required, the Certificate Holder performing a repair or alteration shall submit the completed form, meeting the requirements of the NBIC, to the National Board.

- b) When registration of the forms is not required, the Certificate Holder may register the completed form, meeting the requirements of the NBIC, with the National Board.
- c) The “R” or “NR” Certificate Holder should be aware that some Jurisdictions may require registration of repairs and alterations with the National Board.

### **5.5.1 REGISTRATION FOR REPAIRS**

Form R-1 may be registered with the National Board as noted in NBIC Part 3, 5.5.

### **5.5.2 REGISTRATION FOR ALTERATIONS**

- a) If the pressure-retaining item is originally registered with the National Board, an original Form R-2, together with attachments, shall be registered with the National Board.
- b) If the item was not registered with the National Board, one original Form R-2, together with attachments, may be registered with the National Board or retained as required by the Quality System Manual.

### **5.5.3 REGISTRATION FOR FIBER-REINFORCED VESSELS**

Organizations performing repairs or alterations under an “R” stamp program shall register such repairs or alterations with the National Board.

### **5.5.4 REGISTRATION FOR NUCLEAR REPAIR/REPLACEMENT ACTIVITIES**

Organizations performing repair/replacement activities under the “NR” or “NVR” stamp program shall register forms with the National Board.

### **5.5.5 REGISTRATION FOR GRAPHITE VESSELS**

Organizations performing repair/replacement activities under the “R” stamp program shall register such repairs or alterations with the National Board.

## **(19) 5.6 FORM REGISTRATION LOG**

“R” or “NR” Certificate Holders shall maintain a log or multiple logs documenting unique and sequentially numbered Form “R” Reports that are registered with the National Board. The logs shall include, as a minimum, each form’s unique registration number, type (R-1, R-2, NR-1, etc.), description of work performed, date of acceptance by the Authorized Inspection Agency, and date the report was submitted to the National Board.

## **5.7 STAMPING REQUIREMENTS FOR REPAIRS AND ALTERATIONS**

### **5.7.1 GENERAL**

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.

## 5.7.2 STAMPING REQUIREMENTS FOR REPAIRS

- a) Pressure-retaining items repaired in accordance with the NBIC shall be stamped as required by this section.
- b) Subject to the acceptance of the Jurisdiction and the concurrence of the Inspector, nameplates and stamping may not be required for routine repairs (see NBIC Part 3, 3.3.2). In all cases, the type and extent of repairs necessary shall be considered prior to waiving the requirement.
- c) Stamping or nameplate shall be applied adjacent to the original manufacturer's stamping or nameplate. A single repair nameplate or stamping may be used for more than one repair to a pressure-retaining item, provided each is carried out by the same certificate holder. The date of each repair, corresponding with the date on associated Form R-1, shall be stamped on the nameplate.

## 5.7.3 STAMPING REQUIREMENTS FOR ALTERATIONS

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

## 5.7.4 STAMPING REQUIREMENTS FOR PARTS

Stamping or nameplate shall be applied in a conspicuous location on the part.

## 5.7.5 SPECIFIC REQUIREMENTS FOR STAMPING AND NAMEPLATES


- a) Required data shall be in characters of at least 5/32 in. (4 mm) high, except that characters for pressure relief valve repair nameplates may be smaller. Markings may be produced by casting, etching, embossing, debossing, stamping, or engraving. The selected method shall not result in any harmful contamination, or sharp discontinuities to, the pressure-retaining item. See NBIC Part 3, Figures 5.7.5-a through 5.7.5-e.
- b) The National Board Code Symbols ("R", "VR", and "NR") are to be stamped; do not emboss.
- c) Stamping directly on items, when used, shall be done with blunt-nose continuous or blunt-nose interrupted dot die stamps. If direct stamping would be detrimental to the item, required markings may appear on a nameplate affixed to the item.
- d) The certificate holder shall use its full name as shown on the *Certificate of Authorization* or an abbreviation acceptable to the National Board.
- e) The letters "RP" shall be stamped below the "R" Symbol Stamp to indicate organizations accredited for performing repairs or alterations to fiber-reinforced plastic items.
- f) The letter "G" shall be stamped below the "R" Symbol Stamp to indicate organizations accredited for performing repairs or alterations to graphite pressure equipment.
- g) The subject nameplate shall be securely attached using a method compatible with the structure or stand-off bracket supporting the nameplate, in a manner that will impede easy removal. The method of attaching this nameplate, as permitted by the original code of construction, may include, but is not limited to:
  - 1) Welding

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

**FIGURE 5.7.5-a**

REQUIRED MARKINGS FOR REPAIRS, WITH USE OF NATIONAL BOARD FORM R-1

REPAIRED BY



CERTIFICATE HOLDER


NATIONAL BOARD "R"  
CERTIFICATE NUMBER

DATE REPAIRED

**FIGURE 5.7.5-b**

REQUIRED MARKINGS FOR ALTERATIONS, WITH USE OF NATIONAL BOARD FORM R-2

ALTERED BY



CERTIFICATE HOLDER

M.A.W.P.

P.S.I.

AT

°F


NATIONAL BOARD "R"  
CERTIFICATE NUMBER

DATE ALTERED

**FIGURE 5.7.5-c**

REQUIRED MARKINGS FOR RE-RATINGS, WITH USE OF NATIONAL BOARD FORM R-2

RE-RATED BY



CERTIFICATE HOLDER

M.A.W.P.

P.S.I.

AT


°F

NATIONAL BOARD "R"  
CERTIFICATE NUMBER

DATE ALTERED

### FIGURE 5.7.5-d


#### REQUIRED MARKINGS FOR PARTS FABRICATED BY WELDING, WITH USE OF NATIONAL BOARD FORM R-3

PART	
	CERTIFICATE HOLDER
	P.S.I. AT °F
	M.A.W.P.
	MANUFACTURER'S SERIAL NO.
NATIONAL BOARD "R" CERTIFICATE NUMBER	YEAR BUILT

**Note 1:** To be indicated only when changed.

### FIGURE 5.7.5-e

#### REQUIRED MARKINGS FOR NUCLEAR REPAIRS OR REPLACEMENTS

	
NATIONAL BOARD "NR" CERTIFICATE NUMBER	CERTIFICATE HOLDER
	UNIQUE IDENTIFIER
REPAIR <input type="checkbox"/>	
REPLACEMENT <input type="checkbox"/>	
	DATE OF REPAIR OR REPLACEMENT

## 5.8 STAMPING FOR FIBER-REINFORCED VESSELS

The attachment of a nameplate to a repaired or altered vessel or tank shall indicate that work was performed in accordance with requirements of this code. The attachment of a nameplate shall be done only with knowledge and authorization of the Inspector. The certificate holder responsible for repair or alteration shall apply the stamping nameplate. Required stamping and nameplate information are shown in NBIC Part 3, 5.7.

### 5.8.1 STAMPING FOR REPAIRS

Pressure-retaining items repaired in accordance with the NBIC shall have a nameplate as required by NBIC Part 3, 5.7. Subject to the acceptance of the Jurisdiction and the concurrence of the Inspector, nameplates may not be required for routine repairs (See NBIC Part 3, 5.7.2 b). In all cases, the type and extent of repairs necessary shall be considered prior to waiving the requirement.

### 5.8.2 STAMPING FOR ALTERATIONS

The nameplate shall be applied in accordance with NBIC Part 3, 5.7. Location of nameplate shall be documented under "Remarks" on NBIC Form R-2 line 9.

## **5.9 STAMPING REQUIREMENTS FOR YANKEE DRYERS**

- a) Stamping is not required for repairs that do not affect pressure-retaining capability of the Yankee shell, as indicated on the De-rate Curve, or other pressure-retaining parts, as indicated on the original Manufacturer's Data Report.
- b) Stamping is required for repairs that affect pressure-retaining capability of the Yankee Dryer shell, as indicated on the De-rate Curve, or other pressure-retaining parts as indicated on the original Manufacturer's Data Report.
- c) Stamping is required for alterations as listed in NBIC Part 3, S5.7.2.
- d) Stamping, when required, shall meet the requirements for stamping in NBIC Part 3, 5.7.2. The location of stamping shall be described in the "Remarks" section of Form R-2.

## **5.10 ALTERNATIVE MARKING AND STAMPING FOR GRAPHITE PRESSURE EQUIPMENT**

- a) General Requirements
  - 1) This procedure may be used in lieu of the stamping and nameplate requirements defined in this section.
  - 2) The required data as defined in this section shall be 5/32 in. (4 mm) high, minimum.
  - 3) The National Board Code Symbol "R" shall be used to make the impression in the cement.
- b) Application of the "R" Code Symbol
  - 1) The graphite surface shall be clean and smooth.
  - 2) Apply a thin coating of cement onto the code part. The cement should have the consistency of toothpaste.
  - 3) Apply sufficient heat to the cement so that it begins to form a skin.
  - 4) Apply a coating of a thinned release agent, such as "anti-seize," to the tip of the "R" stamp with a brush.
  - 5) Press the coated stamp all the way to the bottom of the cement and remove by pulling straight out before the cement hardens.
  - 6) Cure or heat the impression as required.
  - 7) When cured, the part may be washed to remove any excess release agent.
- c) Application of characters directly to graphite
  - 1) Use a very thin template of a flexible material (stainless steel; flexible and easily cleaned).
  - 2) Place the template over a clean smooth surface.
  - 3) Hold the template securely and trowel over with approved cement to fill all of the template area.
  - 4) Carefully lift the template from the graphite part and examine the detail of the characters.
  - 5) If acceptable, cure the cement.

- 6) If the characters are incorrect or damaged, wipe off the cement with a compatible solvent and reapply.

**Note:** The preceding methods can be applied jointly to identify the graphite part and to transfer the "R" stamp.

## 5.11 REMOVAL OF ORIGINAL STAMPING OR NAMEPLATE

If it becomes necessary to remove original stamping, the Inspector shall, subject to the approval of the Jurisdiction, witness making of a facsimile of stamping, the obliteration of old stamping, and transfer of stamping to the new item. When stamping is on a nameplate, the Inspector shall witness transfer of nameplate to the new location. Any relocation shall be described on the applicable NBIC "R" Form. The re-stamping or replacement of a code symbol stamp shall be performed only as permitted by the governing code of construction.

## ~~5.12 REPAIR AND ALTERATION FORMS AND INSTRUCTIONS FOR COMPLETING FORMS~~

~~The following forms may be used for documenting specific requirements as indicated on the top of each form.~~

### ~~5.12.1 FORM R-1, REPORT OF REPAIR, NB-66~~

### ~~5.12.2 FORM R-2, REPORT OF ALTERATION, NB-229~~

### ~~5.12.3 FORM R-3, REPORT OF PARTS FABRICATED BY WELDING, NB-230~~

### ~~5.12.4 FORM R-4, REPORT SUPPLEMENT SHEET, NB-231~~

### ~~5.12.4.1 INSTRUCTIONS FOR COMPLETING NATIONAL BOARD FORM R-1 REPORT~~

(19)

~~These instructions are to be used when completing the National Board Form R-1, Report of Repairs. When computer generated, the format of the form shall replicate the type and relative location of the information depicted on the Form R-1 shown in NBIC Part 3, 5.12.1. The numbers below correspond to the "circled" numbers shown on the Form R-1. Note that a fillable version of the Form R-1 (NB-66,) is available on the National Board website, [www.nationalboard.org](http://www.nationalboard.org).~~

- ~~1) Initials of the authorized representative of the "R" Certificate Holder.~~
- ~~2) Initials of the Inspector reviewing the "R" Certificate Holders work.~~
- ~~3) When registering a Form R-1 Report with the National Board, this line is solely designated for a unique sequential number assigned by the "R" Certificate Holder. When the "R" Form is not to be registered, indicate so by "N/A". As described in NBIC Part 3, 5.6, a log shall be maintained identifying sequentially, any Form "R" registered with the National Board.~~
- ~~4) If applicable, document the unique purchase order, job, or tracking number assigned by the organization performing the work.~~
- ~~5) The name and address of the National Board "R" Certificate Holder performing the work as it appears on the "Certificate of Authorization".~~
- ~~6) Name and address of the owner of the pressure-retaining item.~~

- ~~7) Name and address of plant or facility where the pressure-retaining item is installed.~~
- ~~8) Description of the pressure-retaining item, such as boiler or pressure vessel, or piping. Include the applicable unit identification.~~
- ~~9) Name of the original manufacturer of the pressure-retaining item. If the original manufacturer is unknown, indicate by, "unknown."~~
- ~~10) Document the serial number of the pressure-retaining item if assigned by the original manufacturer. If there is no serial number assigned or is unknown, indicate "unknown."~~
- ~~11) When the pressure-retaining item is registered with the National Board, document the applicable registration number. If the pressure-retaining item is installed in Canada, indicate the Canadian design registration number (CRN), and list the drawing number under "other." If the item is not registered, indicate, "none."~~
- ~~12) Indicate the jurisdiction number assigned to the pressure retaining item, if available.~~
- ~~13) Indicate any other unique identifying nomenclature assigned to the pressure retaining item by the owner or user.~~
- ~~14) Identify the year in which fabrication/construction of the pressure retaining item was completed.~~
- ~~15) Indicate edition and addenda of the NBIC under which this work is being performed.~~
- ~~16) Indicate the name, section, division, edition, and addenda (if applicable) of the original code of construction for the pressure-retaining item.~~
- ~~17) Indicate the name, section, division, edition, and addenda (if applicable) of the construction code used for the work being performed. If code cases are used, they shall be identified in the "Remarks" section.~~
- ~~18) Check the repair type performed on the pressure retaining item.~~
- ~~19) Provide a detailed summary describing the scope of work that was completed to a pressure retaining item (PRI). The information to be considered when describing the scope of work should include such items as, the nature of the repair (i.e. welding, bonding, cementing), the specific location of the work performed to the PRI, the steps taken to remove a defect or as allowed by 3.3.4.8 to remain in place, the method of repair described as listed in the examples of Part 3, Section 3 or supplemental section if applicable, and the acceptance testing and/or examination method used in accordance with the NBIC. When additional space is required to describe the scope of work, a Form R-4 shall be used and attached (check box). If a FITNESS FOR SERVICE Form (NB-403) is part of the Form R-1 repair package, check box and attach the form. Information determined to be of a proprietary nature need not be included, but shall be stated on the form.~~
- ~~20) Indicate type of pressure test applied (Liquid, Pneumatic, Vacuum, Leak). If no pressure test applied, indicate "none."~~
- ~~21) Indicate test pressure applied.~~
- ~~22) Indicate maximum allowable working pressure (MAWP) for the pressure retaining item, if known.~~
- ~~23) As applicable, identify what Replacement Parts manufactured by welding or bonding were introduced as needed to complete the scope of work. Indicate part, item number, manufacturer's name, stamped identification, and data report type or Certificate of Compliance.~~
- ~~24) Indicate any additional information pertaining to the work involved (e.g., routine repairs, code cases).~~
- ~~25) When registering a Form R-1 Report with the National Board, this line is solely designated for a unique sequential number assigned by the "R" Certificate Holder. When the "R" Form is not to be registered,~~



~~indicate so by "N/A". As described in NBIC Part 3, 5.6, a log shall be maintained identifying sequentially, any Form "R" registered with the National Board.~~

- ~~26) If applicable, document the unique purchase order, job, or tracking number assigned by organization performing work.~~
- ~~27) Type or print name of authorized representative of the "R" Certificate Holder attesting to accuracy of the work described.~~
- ~~28) Indicate National Board "R" Certificate of Authorization number.~~
- ~~29) Indicate month, day, and year that the "R" Certificate of Authorization expires.~~
- ~~30) 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.~~
- ~~31) Signature of "R" Certificate Holder authorized representative.~~
- ~~32) Enter month, day, and year repair certified.~~
- ~~33) Type or print name of Inspector.~~
- ~~34) Indicate Inspector's Jurisdiction.~~
- ~~35) Indicate Inspector's employer.~~
- ~~36) Indicate address of Inspector's employer (city and state or province).~~
- ~~37) Indicate month, day, and year of final inspection by Inspector. For routine repairs this shall be the month, day, and year the Inspector reviews the completed routine repair package.~~
- ~~38) Inspector's National Board commission number and endorsement that qualifies the Inspector to sign this report, and when required by the Jurisdiction, the applicable State or Provincial numbers.~~
- ~~39) Signature of Inspector.~~
- ~~40) Indicate month, day, and year of Inspector signature~~

#### **5.12.4.2 — INSTRUCTIONS FOR COMPLETING NATIONAL BOARD FORM R-2 REPORT**

~~These instructions are to be used when completing the National Board Form R-2, Report of Alteration. The numbers below correspond to the "circled" numbers depicted on Form R-2 in NBIC Part 3, 5.12.2. When computer generated, the format of the form shall replicate the type and relative location of the information depicted on the Form R-2 Report of Alteration. Note that a fillable version of the Form R-2 (NB-229) is available on the National Board website.~~

- ~~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 pressure retaining item by the owner or user.~~
- ~~15) Identify the year in which fabrication/construction of the pressure retaining item was completed.~~
- ~~16) Indicate edition and addenda of the NBIC under which this work is being performed, as applicable.~~
- ~~17) Indicate the name, section, division, edition, and addenda (if applicable) of the original code of construction for the pressure retaining item.~~
- ~~18) Indicate the name, section, division, edition, and addenda (if applicable) of the construction code used for the work being performed. If code cases are used, they shall be identified in the "Remarks" section.~~
- ~~19) Provide a detailed summary of the scope of design that was performed. When additional space is required to describe the design scope, a Form R-4 shall be used and attached (check box if needed).~~
- ~~20) The information to be considered when describing the construction scope of work should include such items as, the nature of the alteration (i.e. welding, bonding, cementing), the specific location of the work performed to the pressure retaining item, the steps taken to remove a defect or as allowed by NBIC Part 3, Paragraph 3.3.4.8 to remain in place, and the method of alteration described as listed in the examples of NBIC Part 3, Paragraph 3.4.4 or applicable supplement. When additional space is required to describe the construction scope, a Form R-4 shall be used and attached (check box if needed).~~
- ~~21) Indicate type of pressure test applied (liquid, pneumatic, vacuum, leak). If no pressure test applied, indicate "none."~~
- ~~22) Indicate test pressure applied.~~
- ~~23) Indicate maximum allowable working pressure (MAWP) for the pressure retaining item. (As altered)~~
- ~~24) 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.~~

- ~~25) If applicable, document the unique purchase order, job, or tracking number assigned by organization performing work.~~
- ~~26) 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.~~
- ~~27) Indicate any additional information pertaining to the work involved (e.g. code cases, interpretations used).~~
- ~~28) Type or print name of the National Board "R" Certificate of Authorization authorized representative responsible for design certification.~~
- ~~29) Indicate National Board "R" Certificate of Authorization number.~~
- ~~30) Indicate month, day, and year that the "R" Certificate of Authorization expires.~~
- ~~31) Indicate month, day, and year the alteration was certified.~~
- ~~32) Record the name of National Board "R" Certificate of Authorization holder who performed the design portion of the work, using full name as shown on the "Certificate of Authorization" or an abbreviation acceptable to the National Board.~~
- ~~33) Signature of National Board "R" Certificate of Authorization authorized representative for the design change.~~
- ~~34) Type or print the name of Inspector certifying the design review.~~
- ~~35) Indicate Inspector's Jurisdiction.~~
- ~~36) Indicate Inspector's employer.~~
- ~~37) Indicate address of Inspector's employer (city and state or province).~~
- ~~38) Indicate the month, day and year of the design certification by the Inspector.~~
- ~~39) Signature of the Inspector certifying the design review.~~
- ~~40) Inspectors National Board commission number and endorsement that qualifies the Inspector to sign this report, and when required by the Jurisdiction, the applicable State or Provincial numbers.~~
- ~~41) Type or print name of the National Board "R" Certificate of Authorization authorized representative responsible for any construction.~~
- ~~42) Indicate the National Board "R" Certificate of Authorization number.~~
- ~~43) Indicate month, day, and year the National Board "R" Certificate of Authorization expires.~~
- ~~44) Indicate the date the alteration was certified.~~
- ~~45) Record the name of National Board "R" Certificate of Authorization holder who performed the construction portion of the described work, using full name as shown on the Certificate of Authorization or an abbreviation acceptable to the National Board.~~
- ~~46) Signature of National Board "R" Certificate of Authorization authorized representative.~~
- ~~47) Type or print the name of Inspector certifying the construction inspection.~~

- ~~48) Indicate the Inspector's Jurisdiction.~~
- ~~49) Indicate Inspector's employer.~~
- ~~50) Indicate address of Inspector's employer (city and state or province).~~
- ~~51) Indicate the month, day and year of the final inspection by the Inspector.~~
- ~~52) Indicate the month, day and year the completed Form R-2 was signed by the Inspector.~~
- ~~53) Signature of the Inspector certifying the construction inspection.~~
- ~~54) Inspector's National Board commission number and endorsement that qualifies the Inspector to sign this report, and when required by the Jurisdiction, the applicable State or Provincial numbers.~~

~~(19) **5.12.4.3 INSTRUCTIONS FOR COMPLETING NATIONAL BOARD FORM R-3 REPORT**~~

~~This guide is to be used when completing the National Board Form R-3, Report of Parts Fabricated by Welding. The numbers below correspond to the "circled" numbers shown on the Form R-3 in NBIC Part 3, 5.12.3. When computer generated, the format of the form shall replicate the type and relative location of the information depicted on the Form R-3 Report of Parts Fabricated by Welding. Note that a fillable version of the Form R-3 (NB-230) is available on the National Board website.~~

- ~~1) Initials of the National Board "R" Certificate of Authorization authorized representative who registers the Form R-3.~~
- ~~2) Initials of the Inspector who certified the completed Form R-3 for registration.~~
- ~~3) When registering a Form R-3 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, indicated so by "N/A". 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.~~
- ~~4) The name and address of the National Board "R" Certificate Holder who manufactured the welded parts as it appears on the "Certificate of Authorization."~~
- ~~5) If applicable, document the unique purchase order, job, or tracking number assigned by organization performing work.~~
- ~~6) 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.~~
- ~~7) Document name of organization responsible for specifying the code design conditions, if known. If origin of design conditions are not known, state "unknown."~~
- ~~8) Document name of organization responsible for performing the code design, if known. If code design organization is not known, state "unknown."~~
- ~~9) Name, section, and division of the design code, if known. If the design is not known, state "unknown."~~
- ~~10) Indicate code edition year used for fabrication.~~
- ~~11) Indicate code addenda date used for fabrication, if applicable.~~
- ~~12) Indicate the code paragraph reference for formula used to establish the MAWP, if known. If the code reference of the formula is not known, state "unknown."~~
- ~~13) If available, identify component by part's original name, function, or use the original equipment manufacturer's "mark or item number."~~

- ~~14) Indicate quantity of named parts.~~
- ~~15) Match line number of part references for Identification of Parts in item 5 and the Description of Parts in item 6.~~
- ~~16) Indicate manufacturer's serial number or identification number for the named part.~~
- ~~17) Indicate drawing number for the named part.~~
- ~~18) Indicate maximum allowable working pressure (MAWP) for the part, if known.~~
- ~~19) Indicate test pressure, if applied.~~
- ~~20) Identify the year in which fabrication/construction of the item was completed.~~
- ~~21) Use inside diameter for size; indicate shape as square, round, etc.~~
- ~~22) Indicate the complete material specification number and grade.~~
- ~~23) Indicate nominal thickness of plate and minimum thickness after forming.~~
- ~~24) Indicate shape as flat, dished, ellipsoidal, or hemispherical.~~
- ~~25) Indicate minimum thickness after forming.~~
- ~~26) Indicate the complete material specification number and grade for the head or end.~~
- ~~27) Indicate outside diameter.~~
- ~~28) Indicate minimum thickness of tubes.~~
- ~~29) Indicate the complete material specification number and grade for tubes.~~
- ~~30) Indicate any additional information pertaining to the work involved (e.g. code cases). 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.~~
- ~~31) When registering a Form R-3 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, indicated so by "N/A". 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.~~
- ~~32) If applicable, document the unique purchase order, job, or tracking number assigned by organization performing work.~~
- ~~33) Type or print name of authorized representative of the "R" Certificate Holder attesting to accuracy of the work described.~~
- ~~34) Indicate National Board "R" Certificate of Authorization number.~~
- ~~35) Indicate month, day, and year that the "R" Certificate of Authorization expires.~~
- ~~36) Indicate the date the repair was certified.~~
- ~~37) 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.~~
- ~~38) Signature of National Board "R" Certificate of Authorization authorized representative.~~
- ~~39) Type or print name of Inspector.~~

- ~~40) Indicate Inspector's Jurisdiction.~~
- ~~41) Indicate Inspector's employer.~~
- ~~42) Indicate address of Inspector's employer (city and state or province).~~
- ~~43) Indicate month, day, and year of final inspection by Inspector.~~
- ~~44) Indicate the month, day and year the completed Form "R" was signed by the Inspector.~~
- ~~45) Signature of Inspector.~~
- ~~46) Inspector's National Board commission number and endorsement that qualifies the Inspector to sign this report, and when required by the Jurisdiction, the applicable State or Provincial numbers.~~

~~(19) — **5.12.4.4 — INSTRUCTIONS FOR COMPLETING NATIONAL BOARD FORM R-4 REPORT**~~

~~This guide is to be used when completing the National Board Form R-4, Report Supplement Sheet. The numbers below correspond to the "circled" numbers shown on the Form R-4 in NBIC Part 3, 5.12.4. When computer generated, the format of the form shall replicate the type and relative location of the information depicted on the Form R-4, Report Supplement Sheet. Note that a fillable version of the Form R-4 (NB-231) is available on the National Board website.~~

- ~~1) 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, Paragraph 5.6, a log shall be maintained identifying unique and sequentially numbered Form "R" reports that are registered with the National Board. Complete information identical to that shown on the Form "R" to which this sheet is a supplement.~~
- ~~2) If applicable, document the unique purchase order, job, or tracking number, assigned by the organization performing work.~~
- ~~3) The name and address of the Certificate Holder performing the work as it appears on the "Certificate of Authorization."~~
- ~~4) Name and address of the owner of the pressure retaining item.~~
- ~~5) Name and address of plant or facility where the pressure retaining item is installed.~~
- ~~6) Indicate the Form "R" type to which this report is supplementary. Example: Form R-1, Form R-2, Form R-3.~~
- ~~7) Indicate the reference line number from the Form "R" to which this report is supplementary.~~
- ~~8) Complete information for which there was insufficient space on the reference Form "R".~~
- ~~9) Indicate the date certified.~~
- ~~10) Signature of the repair organizations authorized representative.~~
- ~~11) 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.~~
- ~~12) Indicate the date the form was completed by the Inspector.~~
- ~~13) Signature of the Inspector.~~
- ~~14) Inspector's National Board commission number and endorsement that qualifies the Inspector to sign this report, and when required by the Jurisdiction, the applicable State or Provincial numbers.~~

~~5.125~~ ~~FORM NR-1, NUCLEAR COMPONENTS AND SYSTEMS IN NUCLEAR POWER PLANTS, SEE PG. 96~~

~~5.125.1~~ ~~GUIDE FOR COMPLETING NATIONAL BOARD FORM NR-1 REPORT OF REPAIR/REPLACEMENT ACTIVITIES FOR NUCLEAR FACILITIES~~

~~This guide is to be used when completing the National Board Form NR-1, Report of Repair/Replacement Activities for Nuclear Facilities. When computer-generated, the form shall replicate the content and format of the information depicted on the Form NR-1, Report of Repair/Replacement Activities for Nuclear Facilities.~~

~~Title Block: Check type of activity, repair/replacement and/or rerating, as applicable.~~

~~Check category of activity, 1, 2, or 3, as described in Part 3, Paragraph 1.6.2.~~

- ~~1) Name and address of the organization, as shown on the National Board "NR" Certificate of Authorization, which performed the activity.~~
- ~~2) Indicate NR Form Registration Number.~~
- ~~3) Indicate the repair/replacement plan, job number, etc., as applicable, assigned by the organization that performed the work for traceability to documentation.~~
- ~~4) Name and address of the owner of the nuclear facility.~~
- ~~5) Name and address of the nuclear power plant and, if applicable, identification of the unit.~~
- ~~6) Identify the system or component (e.g., residual heat removal, reactor coolant) with which the repair/replacement and/or re-rating activity is associated.~~
- ~~7) Identify the original design specification number and revision for the system or component listed in line 4.~~
- ~~8) Identify the original construction code, edition/addenda used for the system or component identified in line 4.~~
- ~~9) NBIC Edition used for performing activities specified on this form.~~
- ~~10) Organization having responsibility for design when there is a change from the original design specification.~~
- ~~11) Identify code edition/addenda used for design, when applicable.~~
- ~~12) Check the type of test conducted (e.g., hydrostatic, pneumatic, system leakage, exempt, or other) and indicate the pressure applied when applicable.~~
- ~~13) Indicate the number of components where work was performed. Each component shall be indicated on page 2 of the form NR-1.~~
- ~~14) Provide a detailed summary describing the scope of work completed. Information to be considered should include type of work (welding, brazing, fusing), location, steps taken for removal or acceptance of defects, examinations, testing, heat treat, and other special processes or methods utilized. If Necessary, attach additional data, sketch, drawing, Form R-4, etc. In the remarks section state if additional data is attached.~~
- ~~15) Indicate any additional information pertaining to the work, including manufacturer's data reports.~~
- ~~16) Number in sequence beginning with No. 1 to identify each component work was performed. This number may be used to correspond with the detailed description of work performed.~~

- ~~17) Identify the type of item, i.e. piping, pump, valve, etc.~~
- ~~18) Identify the manufacturer's name of component.~~
- ~~19) Identify the manufacturer's serial no. or other assigned number for traceability.~~
- ~~20) Identify the National Board registration number, if previously assigned.~~
- ~~21) Identify the code class criteria, as assigned for each component.~~
- ~~22) Identify the code section used to perform work.~~
- ~~23) Identify Code section year and/or addenda used to perform work.~~
- ~~24) Identify any code cases used for work performed.~~
- ~~25) Identify any revisions to be made to the design specifications or if any design reconciliations were performed.~~
- ~~26) Type or print name of authorized representative from the certificate holder.~~
- ~~27) Name of the organization that performed the identified work, using the full name as shown on the *Certificate of Authorization*, or an abbreviation acceptable to the National Board.~~
- ~~28) Indicate code section as applicable to the repair/replacement activity and/or re-rating activity performed.~~
- ~~29) Indicate National Board *Certificate of Authorization* number.~~
- ~~30) Indicate month, day, and year the certificate expires.~~
- ~~31) Signature of authorized representative from the NR certificate holder.~~
- ~~32) Indicate month, day and year of signature by the Authorized Representative.~~
- ~~33) Title of authorized representative as defined in the Quality Program.~~
- ~~34) Type or print name of Authorized Nuclear Inspector.~~
- ~~35) Indicate the Jurisdiction where the activity is performed, when required.~~
- ~~36) Indicate Authorized Nuclear Inspector's employer.~~
- ~~37) Indicate month, day, and year of inspection by the Authorized Nuclear Inspector.~~
- ~~38) Signature of Authorized Nuclear Inspector.~~
- ~~39) Indicate month, day, and year of signature by the Authorized Nuclear Inspector.~~
- ~~40) National Board Commission number and required endorsements.~~

~~5.126 — **FORM NVR-1, NUCLEAR PRESSURE RELIEF DEVICES, SEE PG. 99**~~

~~5.126.1 — **GUIDE FOR COMPLETING NATIONAL BOARD FORM NVR-1 REPORT OF REPAIR/REPLACEMENT ACTIVITIES FOR NUCLEAR PRESSURE RELIEF DEVICES**~~

~~This guide is to be used when completing the National Board Form NVR-1, Report of Repair/Replacement Activities for Nuclear Pressure Relief Devices. When computer generated, the format of the form shall~~



~~replicate the type and relative location of the information depicted on the Form NVR-1, Report of Repair/Replacement Activities for Nuclear Pressure Relief Devices.~~

~~Title Block: Check type of activity, repair/replacement, as applicable.~~

~~Check category of activity, 1, 2, or 3, as described in Part 3, Paragraph 1.6.2.~~

- ~~1) Name and address of the organization, as shown on the National Board "VR" and "NR" Certificates of Authorization, which performed the activity.~~
- ~~2) Indicate NVR Form Registration Number.~~
- ~~3) Indicate the repair/replacement plan number, job number, etc., as applicable for traceability, assigned by the organization that performed the work.~~
- ~~4) Name and address of the organization for which the work was performed.~~
- ~~5) Name and address of the owner nuclear facility.~~
- ~~6) Name and address of the nuclear facility and, if applicable, identification of the unit.~~
- ~~7) Identify the edition, addenda, and as applicable, code cases of the code used for the inservice inspection activity.~~
- ~~8) Identify the edition, addenda, and as applicable, code cases of the code used for the repair/replacement activity.~~
- ~~9) Identify the NBIC edition used for the repair/replacement activity.~~
- ~~10) Identify the organization responsible for design or design reconciliation, if applicable.~~
- ~~11) Indicate the set pressure of the valve.~~
- ~~12) Indicate the blowdown, if applicable, as a percentage of set pressure.~~
- ~~13) Indicate the location of testing.~~
- ~~14) Indicate medium (steam, air, etc.) used for the adjustment of the set pressure and, if applicable, blowdown.~~
- ~~15) Provide a detailed summary describing the scope of work completed. Information to be considered should include type of work (welding, brazing, fusing), location, steps taken for removal or acceptance of defects, examinations, testing, heat treat, and other special processes or methods utilized. If Necessary, attach additional data, sketch, drawing, Form R-4, etc. If additional data is attached, so state in the remarks section.~~
- ~~16) Indicate any additional information pertaining to the work, such as, additional documentation that is attached to this form to further support item 15.~~
- ~~17) Manufacturer's name of the affected item.~~
- ~~18) Describe the type of pressure relief device (e.g., safety valve, safety relief valve, pressure relief valve).~~
- ~~19) Manufacturer's serial number of the affected item.~~
- ~~20) National Board number, if applicable, of the affected item.~~
- ~~21) Indicate the service as steam, liquid, air/gas, etc.~~
- ~~22) Indicate the pressure relief device by inlet size, in inches.~~

- ~~23) Indicate the year the affected item was manufactured.~~
- ~~24) Indicate the name, section and division of the original construction code for the affected item.~~
- ~~25) Indicate the code class for the affected item as applicable, i.e. Class 1, 2 or 3.~~
- ~~26) Indicate the construction code edition for the affected item.~~
- ~~27) Indicate the construction code addenda, as applicable, for the affected item.~~
- ~~28) Indicate any applicable code cases used for manufacturing of the affected item.~~
- ~~29) Name of the replacement part.~~
- ~~30) Identifying number of the replacement part.~~
- ~~31) Number/quantity of each replacement part used.~~
- ~~32) Indicate the Serial number or other traceability used by the manufacturer of the replacement part.~~
- ~~33) Type or print name of authorized representative from the certificate holder.~~
- ~~34) Indicate code as applicable to the repair/replacement activity performed.~~
- ~~35) Indicate National Board Certificate of Authorization number, if applicable for the "VR" Stamp.~~
- ~~36) Indicate month, day, and year the certificate expires, if applicable for the "VR" Stamp.~~
- ~~37) Indicate National Board Certificate of Authorization number, if applicable for the "NR" Stamp.~~
- ~~38) Indicate month, day, and year the certificate expires, if applicable for the "NR" Stamp.~~
- ~~39) Signature of authorized representative from the certificate holder defined in item 27 above.~~
- ~~40) Indicate month, day, and year of signature by the authorized representative.~~
- ~~41) Title of authorized representative as defined in the Quality Program.~~
- ~~42) Type or print name of Authorized Nuclear Inspector.~~
- ~~43) Indicate the Jurisdiction where the activity is performed, when required.~~
- ~~44) Indicate Authorized Nuclear Inspector's employer.~~
- ~~45) Indicate address of Authorized Nuclear Inspector's employer (city and state or province).~~
- ~~46) Indicate month, day, and year of inspection by the Authorized Nuclear Inspector.~~
- ~~47) Signature of Authorized Nuclear Inspector defined in item 42 above.~~
- ~~48) Indicate month, day, and year of signature by the Authorized Nuclear Inspector.~~
- ~~49) National Board Commission number and required endorsements.~~

## **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  
\_\_\_\_\_  
(PQ no., job no., etc.)

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

\_\_\_\_\_  
(address)
2. OWNER: ⑥ \_\_\_\_\_  
(name)

\_\_\_\_\_  
(address)
3. LOCATION OF INSTALLATION: ⑦ \_\_\_\_\_  
(name)

\_\_\_\_\_  
(address)
4. ITEM IDENTIFICATION: ⑧ \_\_\_\_\_ NAME OF ORIGINAL MANUFACTURER: ⑨ \_\_\_\_\_  
(boiler, pressure vessel, or piping)
5. IDENTIFYING NOS: ⑩ \_\_\_\_\_ ⑪ \_\_\_\_\_ ⑫ \_\_\_\_\_ ⑬ \_\_\_\_\_ ⑭ \_\_\_\_\_  
(mfg. serial no.) (National Board no.) (jurisdiction no.) (other) (year built)
6. NBIC EDITION/ADDENDA: ⑮ \_\_\_\_\_  
(edition) (addenda)

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

Construction Code Used for Repair Performed: ⑰ \_\_\_\_\_  
(name / section / division) (edition / addenda)
7. REPAIR TYPE ⑱  welded  graphite pressure equipment  FRP pressure equipment  DOT
8. DESCRIPTION OF WORK:  Form R-4, Report Supplementary Sheet is attached  FFSA Form (NB-403) is attached  
(Use Form R-4, if necessary)

⑲ \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- ⑳ \_\_\_\_\_ Pressure Test, if applied ㉑ \_\_\_\_\_ psi MAWP ㉒ \_\_\_\_\_ psi  
(Liquid, Pneumatic, Vacuum, Leak)
9. REPLACEMENT PARTS: (Attached are Manufacturer's Partial Data Reports or Form R-3's properly completed for the following items of this report):


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

㉓ \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
10. REMARKS: ㉔ \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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Page 1 of 2

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

 <p><b>THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS</b></p>	<p>NB-66, Rev. 16, (01/28/19)</p> <p>(25) _____          (Form "R" Registration no.)</p> <p>(26) _____          (P.O. no., job no., etc.)</p>
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**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) \_\_\_\_\_

This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors • 1055 Crupper Avenue, Columbus, Ohio 43229-1183	Page 2 of 2
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**TABLE S9.2****GUIDE FOR COMPLETING FORM R-1, REPORT OF REPAIR, NB-66**

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

TABLE S9.2 Cont'd

Reference to Circled Numbers in the Form	Description
(19)	Provide a detailed summary describing the scope of work that was completed to a pressure retaining item (PRI). The information to be considered when describing the scope of work should include such items as, the nature of the repair (i.e. welding, bonding, cementing), the specific location of the work performed to the PRI, the steps taken to remove a defect or as allowed by 3.3.4.8 to remain in place, the method of repair described as listed in the examples of Part 3, Section 3 or supplemental section if applicable, and the acceptance testing and or examination method used in accordance with the NBIC. When additional space is required to describe the scope of work, a Form R-4 shall be used and attached (check box). If a FITNESS FOR SERVICE Form (NB-403) is part of the Form R-1 repair package, check box and attach the form. Information determined to be of a proprietary nature need not be included, but shall be stated on the form.
(20)	Indicate type of pressure test applied (Liquid, Pneumatic, Vacuum, Leak). If no pressure test applied, indicate "none."
(21)	Indicate test pressure applied.
(22)	Indicate maximum allowable working pressure (MAWP) for the pressure retaining item, if known.
(23)	As applicable, identify what Replacement Parts manufactured by welding or bonding were introduced as needed to complete the scope of work. Indicate part, item number, manufacturer's name, stamped identification, and data report type or Certificate of Compliance.
(24)	Indicate any additional information pertaining to the work involved (e.g., routine repairs, code cases).
(25)	When registering a Form R-1 Report with the National Board, this line is solely designated for a unique sequential number assigned by the "R" Certificate Holder. When the "R" Form is not to be registered, indicate so by "N/A". As described in NBIC Part 3, 5.6, a log shall be maintained identifying sequentially, any Form "R" registered with the National Board.
(26)	If applicable, document the unique purchase order, job, or tracking number assigned by organization performing work.
(27)	Type or print name of authorized representative of the "R" Certificate Holder attesting to accuracy of the work described.
(28)	Indicate National Board "R" <i>Certificate of Authorization</i> number.
(29)	Indicate month, day, and year that the "R" <i>Certificate of Authorization</i> expires.
(30)	Record name of "R" Certificate Holder who performed the described work, using full name as shown on the <i>Certificate of Authorization</i> or an abbreviation acceptable to the National Board.
(31)	Signature of "R" Certificate Holder authorized representative.
(32)	Enter month, day, and year repair certified.
(33)	Type or print name of Inspector.
(34)	Indicate Inspector's Jurisdiction.
(35)	Indicate Inspector's employer.
(36)	Indicate address of Inspector's employer (city and state or province).

TABLE S9.2 Cont'd

Reference to Circled Numbers in the Form	Description
(37)	Indicate month, day, and year of final inspection by Inspector. For routine repairs this shall be the month, day, and year the Inspector reviews the completed routine repair package.
(38)	Inspector's National Board commission number and endorsement that qualifies the Inspector to sign this report, and when required by the Jurisdiction, the applicable State or Provincial numbers.
(39)	Signature of Inspector.
(40)	Indicate month, day, and year of Inspector signature



FIGURE S9.3.1

FORM R-2, PAGE 1 OF 2

**THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS** NB-229, Rev. 8, (12/07/16)

**FORM R-2 REPORT OF ALTERATION**  
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.)

1a. DESIGN PERFORMED BY: ⑤ \_\_\_\_\_  
(name of "R" organization responsible for design)

\_\_\_\_\_ (address)

1b. CONSTRUCTION PERFORMED BY: ⑥ \_\_\_\_\_  
(name of "R" organization responsible for construction)

\_\_\_\_\_ (address)

2. OWNER OF PRESSURE RETAINING ITEM: ⑦ \_\_\_\_\_  
(name)

\_\_\_\_\_ (address)

3. LOCATION OF INSTALLATION: ⑧ \_\_\_\_\_  
(name)

\_\_\_\_\_ (address)

4. ITEM IDENTIFICATION: ⑨ \_\_\_\_\_ NAME OF ORIGINAL MANUFACTURER: ⑩ \_\_\_\_\_  
(boiler, pressure vessel, or piping)

5. IDENTIFYING NOS: ⑪ \_\_\_\_\_ ⑫ \_\_\_\_\_ ⑬ \_\_\_\_\_ ⑭ \_\_\_\_\_ ⑮ \_\_\_\_\_  
(mfg. serial no.) (National Board no.) (jurisdiction no.) (other) (year built)

6. NBIC EDITION/ADDENDA: ⑯ \_\_\_\_\_ ⑰ \_\_\_\_\_  
(edition) (addenda)

Original Code of Construction for Item: ⑱ \_\_\_\_\_ ⑲ \_\_\_\_\_  
(name / section / division) (edition / addenda)

Construction Code Used for Alteration Performed: ⑳ \_\_\_\_\_ ㉑ \_\_\_\_\_  
(name / section / division) (edition / addenda)


7a. DESCRIPTION OF DESIGN SCOPE:  Form R-4, Report Supplementary Sheet is attached  
⑲ \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7b. DESCRIPTION OF CONSTRUCTION SCOPE:  Form R-4, Report Supplementary Sheet is attached  
⑳ \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

㉒ \_\_\_\_\_ Pressure Test, if applied ㉓ \_\_\_\_\_ psi MAWP ㉔ \_\_\_\_\_ psi

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**FIGURE S9.3.2**  
**FORM R-2, PAGE 2 OF 2**

 <p><b>THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS</b></p>	<p>NB-229, Rev. 8, (12/07/16)</p> <p style="border: 1px solid black; display: inline-block; border-radius: 50%; padding: 2px;">24</p> (Form "R" Registration no.) <p style="border: 1px solid black; display: inline-block; border-radius: 50%; padding: 2px;">25</p> (P.O. no., job no., etc.)
<p>8. REPLACEMENT PARTS: (Attached are Manufacturer's Partial Data Reports or Form R-3's properly completed for the following items of this report):</p> <p>(name of part, item number, data report type or Certificate of Compliance, mfg's. name and identifying stamp)</p> <p style="border: 1px solid black; display: inline-block; border-radius: 50%; padding: 2px;">26</p>	
<p>9. REMARKS: <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">27</span></p>	
<p><b>DESIGN CERTIFICATION</b></p>	
<p>I, <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">28</span>, certify that to the best of my knowledge and belief the statements in this report are correct and that the Design Change described in this report conforms to the <i>National Board Inspection Code</i>. National Board "R" Certificate of Authorization No. _____ expires on <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">30</span></p> <p>Date <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">29</span> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">31</span>, <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">32</span> Signed <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">33</span>  <small>(name of design organization) (authorized representative)</small></p>	
<p><b>CERTIFICATE OF DESIGN CHANGE REVIEW</b></p>	
<p>I, <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">34</span>, holding a valid Commission issued by The National Board of Boiler and Pressure Vessel Inspector <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">36</span> and certificate of competency, where required, issued by the jurisdiction of <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">35</span> and employed by _____ of <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">37</span></p> <p>have reviewed the design change as described in this report and state that to the best of my knowledge and belief such change complies with the applicable requirements of the <i>National Board Inspection Code</i>.          By signing this certificate, neither the undersigned nor my employer makes any warranty, expressed or implied, concerning the work described in this report. Furthermore, neither the undersigned nor my employer shall be liable in any manner for any personal injury, property damage or loss of any kind arising from or connected with this inspection.</p> <p>Date <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">38</span> Signed <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">39</span> Commissions <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">40</span>  <small>(inspector) (National Board and jurisdiction no. including endorsement)</small></p>	
<p><b>CONSTRUCTION CERTIFICATION</b></p>	
<p>I, <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">41</span>, certify that to the best of my knowledge and belief the statements in this report are correct and that all material, construction, and workmanship on this Alteration conforms to the <i>National Board Inspection Code</i>. National Board "R" Certificate of Authorization No. <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">42</span> expires on <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">43</span></p> <p>Date <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">44</span>, <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">45</span> Signed <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">46</span>  <small>(name of alteration organization) (authorized representative)</small></p>	
<p><b>CERTIFICATE OF INSPECTION</b></p>	
<p>I, <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">47</span>, 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 <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">48</span> and employed by <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">49</span> of <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">50</span></p> <p>have inspected the work described in this report on <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">51</span>, _____ and state that to the best of my knowledge and belief, this work complies with the applicable requirements of the <i>National Board Inspection Code</i>. By signing this certificate, neither the undersigned nor my employer makes any warranty, expressed or implied, concerning the work described in this report. Furthermore, neither the undersigned nor my employer shall be liable in any manner for any personal injury, property damage, or loss of any kind arising from or connected with this inspection.</p> <p>Date <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">52</span> Signed <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">53</span> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">54</span>  <small>(inspector) (National Board and jurisdiction no. including endorsement)</small></p>	
<p>This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors • 1055 Grupper Avenue, Columbus, Ohio 43229-1183 <span style="float: right;">Page 2 of 2</span></p>	

**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 pressure retaining item by the owner or user.
(15)	Identify the year in which fabrication/construction of the pressure retaining item was completed.
(16)	Indicate edition and addenda of the NBIC under which this work is being performed, as applicable.
(17)	Indicate the name, section, division, edition, and addenda (if applicable) of the original code of construction for the pressure-retaining item.
(18)	Indicate the name, section, division, edition, and addenda (if applicable) of the construction code used for the work being performed. If code cases are used, they shall be identified in the "Remarks" section.

TABLE S9.3 Cont'd


Reference to Circled Numbers in the Form	Description
(19)	Provide a detailed summary of the scope of design that was performed. When additional space is required to describe the design scope, a Form R-4 shall be used and attached (check box if needed).
(20)	Indicate type of pressure test applied (liquid, pneumatic, vacuum, leak). If no pressure test applied, indicate "none."
(21)	Indicate test pressure applied.
(22)	Indicate maximum allowable working pressure (MAWP) for the pressure retaining item. (As altered)
(23)	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.
(24)	If applicable, document the unique purchase order, job, or tracking number assigned by organization performing work.
(25)	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.
(26)	Indicate any additional information pertaining to the work involved (e.g. code cases, interpretations used).
(27)	Type or print name of the National Board "R" <i>Certificate of Authorization</i> authorized representative responsible for design certification.
(28)	Indicate National Board "R" <i>Certificate of Authorization</i> number.
(29)	Indicate month, day, and year that the "R" <i>Certificate of Authorization</i> expires.
(30)	Indicate month, day, and year the alteration was certified.
(31)	Record the name of National Board "R" <i>Certificate of Authorization</i> holder who performed the design portion of the work, using full name as shown on the " <i>Certificate of Authorization</i> " or an abbreviation acceptable to the National Board.
(32)	Signature of National Board "R" <i>Certificate of Authorization</i> authorized representative for the design change.
(33)	Type or print the name of Inspector certifying the design review.
(34)	Indicate Inspector's Jurisdiction.
(35)	Indicate Inspector's employer.
(36)	Indicate type of pressure test applied (liquid, pneumatic, vacuum, leak). If no pressure test applied, indicate "none."
(37)	Indicate address of Inspector's employer (city and state or province).
(38)	Indicate the month, day and year of the design certification by the Inspector.
(39)	Signature of the Inspector certifying the design review.

TABLE S9.3 Cont'd

Reference to Circled Numbers in the Form	Description
(40)	Inspectors National Board commission number and endorsement that qualifies the Inspector to sign this report, and when required by the Jurisdiction, the applicable State or Provincial numbers.
(41)	Type or print name of the National Board "R" <i>Certificate of Authorization</i> authorized representative responsible for any construction.
(42)	Indicate the National Board "R" <i>Certificate of Authorization</i> number.
(43)	Indicate month, day, and year the National Board "R" <i>Certificate of Authorization</i> expires.
(44)	Indicate the date the alteration was certified.
(45)	Record the name of National Board "R" <i>Certificate of Authorization</i> holder who performed the construction portion of the described work, using full name as shown on the <i>Certificate of Authorization</i> or an abbreviation acceptable to the National Board.
(46)	Signature of National Board "R" <i>Certificate of Authorization</i> authorized representative.
(47)	Type or print the name of Inspector certifying the construction inspection.
(48)	Indicate the Inspector's Jurisdiction.
(49)	Indicate Inspector's employer.
(50)	Indicate address of Inspector's employer (city and state or province).
(51)	Indicate the month, day and year of the final inspection by the Inspector.
(52)	Indicate the month, day and year the completed Form R-2 was signed by the Inspector.
(53)	Signature of the Inspector certifying the construction inspection.
(54)	Inspector's National Board commission number and endorsement that qualifies the Inspector to sign this report, and when required by the Jurisdiction, the applicable State or Provincial numbers.

FIGURE S9.4.1

FORM R-3, PAGE 1 OF 2



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

NB-230, Rev. 4 (12/08/16)

**FORM R-3 REPORT OF PARTS FABRICATED BY WELDING**  
in accordance with provisions of the *National Board Inspection Code*

①  
\_\_\_\_\_  
(Authorized Rep. initials)

②  
\_\_\_\_\_  
(Inspectors initials)

③  
\_\_\_\_\_  
(Form "R-3" Registration no.)

⑤  
\_\_\_\_\_  
(P.O. no., job no., etc.)

1. MANUFACTURED BY: ④ \_\_\_\_\_  
(name of "R" certificate holder)

\_\_\_\_\_  
(address)

2. MANUFACTURED FOR: ⑥ \_\_\_\_\_  
(name)

\_\_\_\_\_  
(address)

3. DESIGN CONDITION SPECIFIED BY: ⑦ \_\_\_\_\_ CODE DESIGN BY: ⑧ \_\_\_\_\_

4. DESIGN CODE: ⑨ \_\_\_\_\_ ⑩ \_\_\_\_\_ ⑪ \_\_\_\_\_ ⑫ \_\_\_\_\_

5. REPAIR/ALTERATION/MODIFICATION ACTIVITIES

Name of Part	Qty.	Line No.	Manufacturer's Identifying No.	Manufacturer's Drawing No.	MAWP	Shop Hydro PSI	Year Built
⑬	⑭	⑮	⑯	⑰	⑱	⑲	⑳


6. DESCRIPTION OF PARTS

Line No.	(a) Connections other than tubes			Heads or Ends			(b) Tubes		
	Size and Shape	Material Spec. No.	Thickness (in.)	Shape	Thickness (in.)	Material Spec. No.	Diameter (in.)	Thickness (in.)	Material Spec. No.
⑮	⑳	㉑	㉒	㉓	㉔	㉕	㉖	㉗	㉘

7. REMARKS: ⑳ \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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 S9.4.2**  
**FORM R-3, PAGE 2 OF 2**

 <b>THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS</b>	NB-230, Rev. 4 (12/08/16) (31) (Form "R-3" Registration no.) (32) (P.O. no., Job no., etc.)
<b>CERTIFICATE OF COMPLIANCE</b>	
<p>I, (33) _____, certify that to the best of my knowledge and belief the statements made in this report are correct and that all material, fabrication, construction, and workmanship of the described parts conforms to the <i>National Board Inspection Code</i> and the standards of construction cited.</p> <p>National Board "R" Certificate of Authorization No. (34) _____ expires on: (35) _____,          Date (36) _____, _____ (37) _____ Signed (38) _____  <small>(name of "R" Certificate holder) (Authorized Representative)</small></p>	
<b>CERTIFICATE OF INSPECTION</b>	
<p>I, (39) _____, 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 (40) _____ and employed by (41) _____ of (42) _____ have inspected the part described in this report on (43) _____, _____ and state that to the best of my knowledge and belief the parts comply with the applicable requirements of the <i>National Board Inspection Code</i>.</p> <p>By signing this certificate, neither the undersigned nor my employer makes any warranty, expressed or implied, concerning the work described in this report. Furthermore, neither the undersigned nor my employer shall be liable in any manner for any personal injury, property damage, or loss of any kind arising from or connected with this inspection.</p> <p>Date (44) _____, _____ Signed (45) _____ Commissions (46) _____  <small>(Inspector) (National Board and Jurisdiction No. including endorsement)</small></p>	
<p>This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors • 1055 Crupper Avenue, Columbus, Ohio 43229-1183 <span style="float: right;">Page 2 of 2</span></p>	

**TABLE S9.4****GUIDE FOR COMPLETING FORM R-3, REPORT OF PARTS FABRICATED BY WELDING,  
NB-230**

Reference to Circled Numbers in the Form	Description
(1)	Initials of the National Board "R" <i>Certificate of Authorization</i> authorized representative who registers the Form R-3.
(2)	Initials of the Inspector who certified the completed Form R-3 for registration.
(3)	When registering a Form R-3 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, indicated so by "N/A". 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.
(4)	The name and address of the National Board "R" Certificate Holder who manufactured the welded parts as it appears on the " <i>Certificate of Authorization</i> ."
(5)	If applicable, document the unique purchase order, job, or tracking number assigned by organization performing work.
(6)	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.
(7)	Document name of organization responsible for specifying the code design conditions, if known. If origin of design conditions are not known, state "unknown."
(8)	Document name of organization responsible for performing the code design, if known. If code design organization is not known, state "unknown."
(9)	Name, section, and division of the design code, if known. If the design is not known, state "unknown."
(10)	Indicate code edition year used for fabrication.
(11)	Indicate code addenda date used for fabrication, if applicable.
(12)	Indicate the code paragraph reference for formula used to establish the MAWP, if known. If the code reference of the formula is not known, state "unknown."
(13)	If available, identify component by part's original name, function, or use the original equipment manufacturer's "mark or item number."
(14)	Indicate quantity of named parts.
(15)	Match line number of part references for Identification of Parts in item 5 and the Description of Parts in item 6.
(16)	Indicate manufacturer's serial number or identification number for the named part.
(17)	Indicate drawing number for the named part.
(18)	Indicate maximum allowable working pressure (MAWP) for the part, if known.
(19)	Indicate test pressure, if applied.
(20)	Identify the year in which fabrication/construction of the item was completed.
(21)	Use inside diameter for size: indicate shape as square, round, etc.
(22)	Indicate the complete material specification number and grade.



TABLE S9.4 Cont'd

Reference to Circled Numbers in the Form	Description
(23)	Indicate nominal thickness of plate and minimum thickness after forming.
(24)	Indicate shape as flat, dished, ellipsoidal, or hemispherical.
(25)	Indicate minimum thickness after forming.
(26)	Indicate the complete material specification number and grade for the head or end.
(27)	Indicate outside diameter.
(28)	Indicate minimum thickness of tubes.
(29)	Indicate the complete material specification number and grade for tubes.
(30)	Indicate any additional information pertaining to the work involved (e.g. code cases). 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.
(31)	When registering a Form R-3 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, indicated so by "N/A". 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.
(32)	If applicable, document the unique purchase order, job, or tracking number assigned by organization performing work.
(33)	Type or print name of authorized representative of the "R" Certificate Holder attesting to accuracy of the work described.
(34)	Indicate National Board "R" Certificate of Authorization number.
(35)	Indicate month, day, and year that the "R" Certificate of Authorization expires.
(36)	Indicate the date the repair was certified.
(37)	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.
(38)	Signature of National Board "R" Certificate of Authorization authorized representative.
(39)	Type or print name of Inspector.
(40)	Indicate Inspector's Jurisdiction.
(41)	Indicate Inspector's employer.
(42)	Indicate address of Inspector's employer (city and state or province).
(43)	Indicate month, day, and year of final inspection by Inspector.
(44)	Indicate the month, day and year the completed Form "R" was signed by the Inspector.
(45)	Signature of Inspector.
(46)	Inspector's National Board commission number and endorsement that qualifies the Inspector to sign this report, and when required by the Jurisdiction, the applicable State or Provincial numbers.



**TABLE S9.5****GUIDE FOR COMPLETING FORM R-4, REPORT SUPPLEMENT SHEET, NB-231**

Reference to Circled Numbers in the Form	Description
(1)	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, Paragraph 5.6, a log shall be maintained identifying unique and sequentially numbered Form "R" reports that are registered with the National Board. Complete information identical to that shown on the Form "R" to which this sheet is a supplement.
(2)	If applicable, document the unique purchase order, job, or tracking number, assigned by the organization performing work.
(3)	The name and address of the Certificate Holder performing the work as it appears on the "Certificate of Authorization."
(4)	Name and address of the owner of the pressure-retaining item.
(5)	Name and address of plant or facility where the pressure-retaining item is installed.
(6)	Indicate the Form "R" type to which this report is supplementary. Example: Form R-1, Form R-2, Form R-3
(7)	Indicate the reference line number from the Form "R" to which this report is supplementary.
(8)	Complete information for which there was insufficient space on the reference Form "R".
(9)	Indicate the date certified.
(10)	Signature of the repair organizations authorized representative.
(11)	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.
(12)	Indicate the date the form was completed by the Inspector.
(13)	Signature of the Inspector.
(14)	Inspector's National Board commission number and endorsement that qualifies the Inspector to sign this report, and when required by the Jurisdiction, the applicable State or Provincial numbers.





**FIGURE S9.6.3**  
**FORM NR-1, PAGE 3 OF 3**

(NR Form Registration No.)

(R/R Plan No., Job No., etc.)

**CERTIFICATE OF COMPLIANCE**

I, (26), employed by (27)  
 certify that to the best of my knowledge and belief the statements made in this report are correct and the repair/replacement activities or re-rating described above conform to (28) and the *National Board Inspection Code "NR"* rules.

National Board *Certificate of Authorization* No. (29) Expiration date: (30)

Signed: (31) Date: (32)

Title: (33)  
 (authorized representative)

**CERTIFICATE OF INSPECTION**

I, (34), 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 (35) and employed by (36) have inspected the repair/replacement and/or re-rating activities described in this report on (37) and state that to the best of my knowledge and belief, these activities have been completed in accordance with the Code specified and the *National Board Inspection Code "NR"* rules.

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.

Signed: (38) Date: (39) Commissions (40)  
 (Inspector) (National Board and endorsement)

**TABLE S9.6****GUIDE FOR COMPLETING FORM NR-1, REPORT OF REPAIR/REPLACEMENT ACTIVITIES FOR NUCLEAR FACILITIES, NB-81**

Reference to Circled Numbers in the Form	Description
	Title Block: Check type of activity, repair/replacement and/or rerating, as applicable.
	Check category of activity, 1, 2, or 3, as described in Part 3, Paragraph 1.6.2.
(1)	Name and address of the organization, as shown on the National Board "NR" Certificate of Authorization, which performed the activity.
(2)	Indicate NR Form Registration Number.
(3)	Indicate the repair/replacement plan, job number, etc., as applicable, assigned by the organization that performed the work for traceability to documentation.
(4)	Name and address of the owner of the nuclear facility.
(5)	Name and address of the nuclear power plant and, if applicable, identification of the unit.
(6)	Identify the system or component (e.g., residual heat removal, reactor coolant) with which the repair/replacement and/or re-rating activity is associated.
(7)	Identify the original design specification number and revision for the system or component listed in line 4.
(8)	Identify the original construction code, edition/addenda used for the system or component identified in line 4.
(9)	NBIC Edition used for performing activities specified on this form.
(10)	Organization having responsibility for design when there is a change from the original design specification.
(11)	Identify code edition/addenda used for design, when applicable.
(12)	Check the type of test conducted (e.g., hydrostatic, pneumatic, system leakage, exempt, or other) and indicate the pressure applied when applicable.
(13)	Indicate the number of components where work was performed. Each component shall be indicated on page 2 of the form NR-1.
(14)	Provide a detailed summary describing the scope of work completed. Information to be considered should include type of work (welding, brazing, fusing), location, steps taken for removal or acceptance of defects, examinations, testing, heat treat, and other special processes or methods utilized. If Necessary, attach additional data, sketch, drawing, Form R-4, etc. In the remarks section state if additional data is attached.
(15)	Indicate any additional information pertaining to the work, including manufacturer's data reports.
(16)	Number in sequence beginning with No. 1 to identify each component work was performed. This number may be used to correspond with the detailed description of work performed.
(17)	Identify the type of item. i.e. piping, pump, valve, etc.
(18)	Identify the manufacturer's name of component.
(19)	Identify the manufacturer's serial no. or other assigned number for traceability.
(20)	Identify the National Board registration number, if previously assigned.
(21)	Identify the code class criteria, as assigned for each component.

(22) Identify the code section used to perform work.

TABLE S9.6 Cont'd

Reference to Circled Numbers in the Form	Description
(23)	Identify Code section year and/or addenda used to perform work.
(24)	Identify any code cases used for work performed.
(25)	Identify any revisions to be made to the design specifications or if any design reconciliations were performed.
(26)	Type or print name of authorized representative from the certificate holder.
(27)	Name of the organization that performed the identified work, using the full name as shown on the Certificate of Authorization, or an abbreviation acceptable to the National Board.
(28)	Indicate code section as applicable to the repair/replacement activity and/or re-rating activity performed.
(29)	Indicate National Board Certificate of Authorization number.
(30)	Indicate month, day, and year the certificate expires.
(31)	Signature of authorized representative from the NR certificate holder.
(32)	Indicate month, day and year of signature by the Authorized Representative.
(33)	Title of authorized representative as defined in the Quality Program.
(34)	Type or print name of Authorized Nuclear Inspector.
(35)	Indicate the Jurisdiction where the activity is performed, when required.
(36)	Indicate Authorized Nuclear Inspector's employer.
(37)	Indicate month, day, and year of inspection by the Authorized Nuclear Inspector.
(38)	Signature of Authorized Nuclear Inspector.
(39)	Indicate month, day, and year of signature by the Authorized Nuclear Inspector.
(40)	National Board Commission number and required endorsements.





**FIGURE S9.7.2**  
**FORM NVR-1, PAGE 2 OF 3**



NB-160, Rev. 8, (03/30/17)

②

(NR Form Registration No.)

③

(R/R Plan No., Job No., etc.)

WORK PERFORMED BY:

① \_\_\_\_\_  
 (Name of "NR" certificate holder)

\_\_\_\_\_  
 (Address of "NR" certificate holder)

PRESSURE RELIEF DEVICE

Name of Mfg.	Type	Mfg. Serial No.	Nat'l Bld No.	Service	Size	Year Built
⑰	⑱	⑲	⑳	㉑	㉒	㉓

CONSTRUCTION CODE

Section	Class	Edition	Addenda	Code Case(s)
㉔	㉕	㉖	㉗	㉘

NAME AND IDENTIFYING NUMBER OF REPLACEMENT PARTS

No.	Part Name	Part Number	Quantity	Serial Number/Traceability No.
1.	㉙	㉚	㉛	㉜
2.				
3.				
4.				
5.				
6.				
7.				



**TABLE S9.7****GUIDE FOR COMPLETING FORM NVR-1, REPORT OF REPAIR/REPLACEMENT ACTIVITIES FOR NUCLEAR PRESSURE RELIEF DEVICES, NB-160**

Reference to Circled Numbers in the Form	Description
	Title Block: Check type of activity, repair/replacement and/or rerating, as applicable.
	Check category of activity, 1, 2, or 3, as described in Part 3, Paragraph 1.6.2.
(1)	Name and address of the organization, as shown on the National Board "VR" and "NR" Certificates of Authorization, which performed the activity.
(2)	Indicate NVR Form Registration Number.
(3)	Indicate the repair/replacement plan number, job number, etc., as applicable for traceability, assigned by the organization that performed the work.
(4)	Name and address of the organization for which the work was performed.
(5)	Name and address of the owner nuclear facility.
(6)	Name and address of the nuclear facility and, if applicable, identification of the unit.
(7)	Identify the edition, addenda, and as applicable, code cases of the code used for the inservice inspection activity.
(8)	Identify the edition, addenda, and as applicable, code cases of the code used for the repair/replacement activity.
(9)	Identify the NBIC edition used for the repair/replacement activity.
(10)	Identify the organization responsible for design or design reconciliation, if applicable.
(11)	Indicate the set pressure of the valve.
(12)	Indicate the blowdown, if applicable, as a percentage of set pressure.
(13)	Indicate the location of testing.
(14)	Indicate medium (steam, air, etc.) used for the adjustment of the set pressure and, if applicable, blowdown.
(15)	Provide a detailed summary describing the scope of work completed. Information to be considered should include type of work (welding, brazing, fusing), location, steps taken for removal or acceptance of defects, examinations, testing, heat treat, and other special processes or methods utilized. If Necessary, attach additional data, sketch, drawing, Form R-4, etc. If additional data is attached, so state in the remarks section.
(16)	Indicate any additional information pertaining to the work, such as, additional documentation that is attached to this form to further support item 15.
(17)	Manufacturer's name of the affected item.
(18)	Describe the type of pressure relief device (e.g., safety valve, safety relief valve, pressure relief valve).
(19)	Manufacturer's serial number of the affected item.
(20)	National Board number, if applicable, of the affected item.
(21)	Indicate the service as steam, liquid, air/gas, etc.

TABLE S9.7 Cont'd

Reference to Circled Numbers in the Form	Description
(22)	Indicate the pressure relief device by inlet size, in inches.
(23)	Indicate the year the affected item was manufactured.
(24)	Indicate the name, section and division of the original construction code for the affected item.
(25)	Indicate the code class for the affected item as applicable, i.e. Class 1, 2 or 3.
(26)	Indicate the construction code edition for the affected item.
(27)	Indicate the construction code addenda, as applicable, for the affected item.
(28)	Indicate any applicable code cases used for manufacturing of the affected item.
(29)	Name of the replacement part.
(30)	Identifying number of the replacement part.
(31)	Number/quantity of each replacement part used.
(32)	Indicate the Serial number or other traceability used by the manufacturer of the replacement part.
(33)	Type or print name of authorized representative from the certificate holder.
(34)	Indicate code as applicable to the repair/replacement activity performed.
(35)	Indicate National Board Certificate of Authorization number, if applicable for the "VR" Stamp.
(36)	Indicate month, day, and year the certificate expires, if applicable for the "VR" Stamp.
(37)	Indicate National Board Certificate of Authorization number, if applicable for the "NR" Stamp.
(38)	Indicate month, day, and year the certificate expires, if applicable for the "NR" Stamp.
(39)	Signature of authorized representative from the certificate holder defined in item 27 above.
(40)	Indicate month, day, and year of signature by the authorized representative.
(41)	Title of authorized representative as defined in the Quality Program.
(42)	Type or print name of Authorized Nuclear Inspector.
(43)	Indicate the Jurisdiction where the activity is performed, when required.
(44)	Indicate Authorized Nuclear Inspector's employer.
(45)	Indicate address of Authorized Nuclear Inspector's employer (city and state or province).
(46)	Indicate month, day, and year of inspection by the Authorized Nuclear Inspector.
(47)	Signature of Authorized Nuclear Inspector defined in item 42 above.
(48)	Indicate month, day, and year of signature by the Authorized Nuclear Inspector.
(49)	National Board Commission number and required endorsements.

(19) TABLE 1.5.1

Form "R" Reports, Records, or Documents	Instructions	Minimum Retention Period
a) Form "R" Reports and supporting records and documentation	The organization performing repairs and alterations shall retain a copy of the completed "R" Form report on file, and all records substantiating the summary of work described in NBIC Part 3, <u>5.12.4.1 Tables S9.2 and S9.3 of Supplement 9, Item 12 19</u> , for a minimum of 5 years. When the method of repair described in NBIC Part 3, 3.3.4.8 is used, the record retention period shall be described in b).	5 years
b) Form "R" Report with REPORT OF FITNESS FOR SERVICE ASSESSMENT FORM (NB-403) attached.	<p>When the method of repair described in NBIC Part 3,3.3.4.8 is used, the record retention period shall be for the duration described on the FITNESS FOR SERVICE ASSESSMENT (FFSA) Form required by the repair method and as described in NBIC Part 2, 4.4.</p> <p>Notes:</p> <ol style="list-style-type: none"> <li>1. The "R" Certificate Holders should be aware that when used, some of the referenced codes and standards identified in NBIC Part 2,, 1.3 describe requirements for permanent record retention throughout the service life of each equipment item.</li> <li>2. When the "R" Certificate Holder is not the owner or user of the equipment, the record retention period is limited to the FFSA-results described on line 8 of the Report of Fitness for Service Assessment Form (NB-403).</li> </ol>	5 years or as described on line 8 as reported on Form NB-403; whichever period is longer.
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. Continuity records shall be maintained for a minimum of 5 years.

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### 3.3.4.6 PATCHES

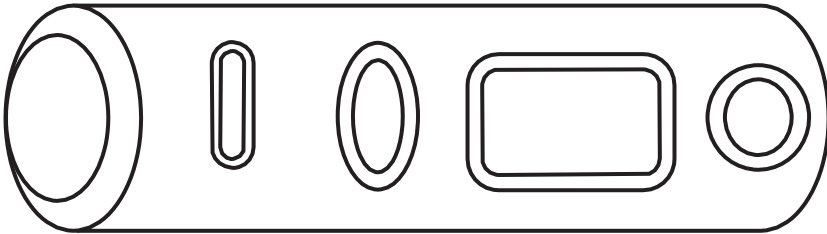
#### a) Flush Patches

- 1) The weld around a flush patch shall be a full penetration weld and the accessible surfaces shall be ground flush where required by the applicable original code of construction. Examples of ~~flush welded welded flush~~ patches are shown in NBIC Part 3, Figure 3.3.4.6-a. ~~The welds shall be subjected to the nondestructive examination method used in the original code of construction or an alternative acceptable to the Inspector and, where required, the Jurisdiction. Nondestructive examination will shall be performed in accordance with the requirements from NBIC Part 3, Section 4.2.~~
- 2) Before installing a flush patch, ~~the the~~ defective material ~~should should shall~~ be removed until sound material is reached. The patch ~~should should shall~~ be ~~rolled formed~~ to the proper shape or curvature. The edges ~~should should shall~~ align without overlap. In stayed areas, the weld seams should come between staybolt rows or riveted seams. Patches shall be made from a material whose composition and thickness meet the intended service. Patches may be any shape or size. If the patch is rectangular, a minimum radius of not less than three times the material thickness shall be provided at the corners. Square corners are not permitted. The completed welds shall meet the requirements of the original code of construction.

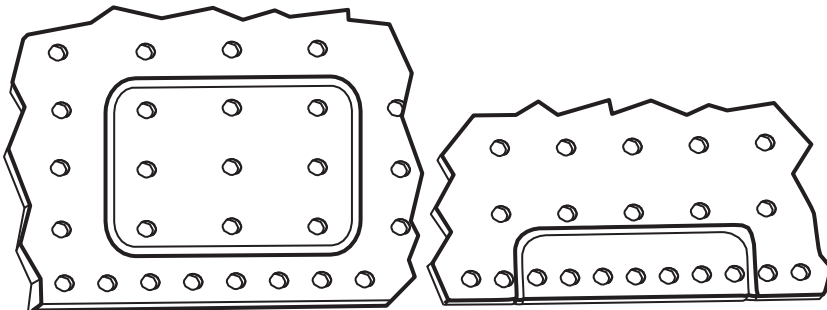
#### b) Tube Patches

In some situations it is necessary to weld a flush patch on a tube, such as when replacing tube sections and accessibility around the complete circumference of the tube is restricted, or when it is necessary to repair a small bulge. This is referred to as a window patch. Suggested methods for window patches are shown in NBIC Part 3, Figure 3.3.4.6-b.

**FIGURE 3.3.4.6-a**  
FLUSH PATCH CONFIGURATIONS IN UNSTAYED AREAS



FLUSH PATCHES IN STAYED AREAS



TION 3

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These changes have evolved from far more extensive changes initially. These changes were made in committee at the July 2019 Subcommittee on Repairs and Alterations. Made to standardize NDE requirements across the NBIC and to reference Part 3, Section 4.2 requirements. Also changes acceptance of alternative NDE methods from being subject only to the Inspector's approval and brings it under the jurisdiction AND the inspector.

Item 18-95

Revised after sent back from MC in July 2019

**Existing wording:**

**S1.1.4 FORMULA AND CALCULATIONS FOR STEAM LOCOMOTIVE BOILERS**

a) Most steam locomotive boilers were manufactured in the first half of the 20<sup>th</sup> 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.

b) This supplement herein, is based in part on the ASME Code, Section III, 1952 Edition, 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, which may be obtained from the Strasburg Rail Road, P.O. Box 96, Strasburg, PA 17579 (717) 687-7421.

**Proposed wording:**

**S1.1.4 FORMULA AND CALCULATIONS FOR STEAM LOCOMOTIVE BOILERS**

a) Most steam locomotive boilers were manufactured in the first half of the 20<sup>th</sup> 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 Currently, ASME, Section I, Part PR and Part PL, govern riveted construction and steam locomotive boiler construction, and these Parts may be referenced for repairs and alterations if appropriate for the boiler under repair/alteration.

b) This supplement herein, is based in part on the ASME Code, Section III, 1952 Edition, 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, which may be obtained from the Strasburg Rail Road, P.O. Box 96, Strasburg, PA 17579 (717) 687-7421.

## **Background for Interpretation 18-100**

**Task Group PM – David Martinez;**

**Task Group members: Marty Russel and Nathan Carter**

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

**General Description:** Revision adding (plugging) heat exchanger tubes with an outside diameter of  $\frac{3}{4}$ " or smaller to NBIC Part 3.3.2 Routine Repairs

**Subgroup:** Repairs and Alterations

**Task Group:** David Martinez (PM)

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

### **3.3.2 ROUTINE REPAIRS**

- a) Routine repairs are repairs for which the requirements for in-process involvement by the Inspector and stamping by the "R" Certificate Holder may be waived as determined appropriate by the Jurisdiction and the Inspector. All other applicable requirements of this code shall be met. Prior to performing routine repairs, the "R" Certificate Holder should determine that routine repairs are acceptable to the Jurisdiction where the pressure-retaining item is installed;
- b) The Inspector, with the knowledge and understanding of jurisdictional requirements, shall be responsible for meeting jurisdictional requirements and the requirements of this code;
- c) The "R" Certificate Holder's Quality System Program shall describe the process for identifying, controlling, and implementing routine repairs. Routine repairs shall be documented on Form R-1 with this statement in the Remarks section: "Routine Repair";
- d) Alternative welding methods without postweld heat treatment as described in NBIC Part 3, 2.5.3 shall not be used for routine repairs.

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

- e) The following repairs may be considered as routine repairs and shall be limited to these categories:
  - 1) Welded repairs or replacements of valves, fittings, tubes, or pipes NPS 5 (DN 125) in diameter and smaller, or sections thereof, where neither postweld heat treatment nor

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

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

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

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

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

6) Plugging of heat exchanger tubes 3/4 in. outside diameter and smaller when explosive plugging is used as method of plugging tubes.

## **Background Interpretation**

### **INTERPRETATION 15-04**

**Subject:** Part 3, Section 3

**Edition:** 2015

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

**Reply:** Yes.

## **Support for Consideration of the Proposed Action**

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

### **QW-193 TUBE-TO-TUBESHEET TESTS**

When the applicable Code Section requires the use of this paragraph for tube-to-tubesheet demonstration mockup qualification, [QW-193.1](#) through [QW-193.1.3](#) shall apply.

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

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

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

**QW-193.1.3 Macro-Examination.** The mockup welds shall be sectioned through the center of the tube for macro-examination. The four exposed surfaces shall be smoothed and etched with a suitable etchant (see QW-470) to give a clear definition of the weld and heat-affected zone. Using a magnification of 10X to 20X, the exposed cross sections of the weld shall confirm

- (a) minimum leak path dimension required by the design
- (b) no cracking
- (c) complete fusion of the weld deposit into the tubesheet and tube wall face

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

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

Legend:  
 $\phi$  Change

**QW-410.83** A change in the type of explosive or a change in the energy content greater than  $\pm 10\%$ .

**QW-410.84** A change in the distance between the explosive charge and the tubesheet face greater than  $\pm 10\%$ .

**QW-410.85** A change in the specified clearance between the tube and the tubesheet greater than  $\pm 10\%$ .

#### **QW-193.2 Performance Qualification Specimens.**

A minimum of five mockup tube-to-tubesheet welds are required to qualify each welder or welding operator. The same rules as those applicable for procedure qualification (QW-193.1) shall be followed, with the following additional requirements and exceptions:

(a) The essential variables in QW-387 shall apply.

(b) Essential performance qualification variables applicable for each welding process listed in QW-350 or QW-360 shall also be observed in addition to the variables of Table QW-388.

(c) Postweld heat treatment may be omitted.

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

#### **Logic to consider motion for approval:**

- Explosion welding to plug leaking tubes is supported by qualified written welding procedures and welder qualification procedures compared to other mechanical tube-plugging methods that are performed with no NBIC guidance.
- Explosion welding does not rely on fusion to join the two materials. It is a pressure weld in which the explosive force joins the two materials. Unlike fusion welding that is allowed in other examples of Routine Repairs, there is no heat affected zone, and PWHT is not needed nor required.
- The majority, if not all explosion tube plugging is performed on tubes  $\frac{3}{4}$ " and smaller, and typically under emergency conditions. No Inspector involvement would be required if this specific category was added to the categories of Routine Repairs
- The explosion tube-plugging method for tubes  $\frac{3}{4}$ " and smaller would be more cost and schedule effective and is proven to be a reliable method for plugging leaking heat exchanger tubes for owners and users.

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

Item 19-11 – Edwards – 01-02-201-13-2020

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**Explanation of Need:** Review the use of “Authorized Nuclear Inspection Agency” within the NBIC.

**Background:** An ANIA can not be an Inservice AIA since Endorsements for nuclear inspectors are issued only to new construction AIA’s. The requirements for qualified Authorized Nuclear Inspectors/Supervisors are specified in NB-263, RCI-1. An NBIC revision is therefore needed to clarify reference to ANIAs in Part 3, 1.6.3 a) under the NR Accreditation Program.

This item was unanimously approved at SC-R/A but received 3 negatives on the MC ballot. There was some confusion in the original description of the proposed action in that reference was also made to revising the definition of “Authorized Nuclear Inspection Agency” in the Glossary (NBIC Parts 1, 2, 3, and 4). The MC negatives agreed with the proposal except that the action did not include a revision to the Glossary.

On further review, the current definition of “Authorized Nuclear Inspection Agency” in the Glossary is acceptable and does not require revision. The updated action for Item 19-11 is therefore to reaffirm revision to ¶1.6.3 a), to include reference to repair and alteration acceptance inspections and to delete reference to NB-369, and with no required change to the Glossary.

Upon discussion, the NR TG proposed rewording the proposed verbiage to replace “authorization” with “accreditation” to better align with the scope of the NB-360 Certificate.

**Proposed Action:** Revise Part 3, ¶1.6.3 a), as follows:

- a) Have and maintain an inspection agreement with an Authorized Nuclear Inspection Agency accepted in accordance with NB-360, *National Board Acceptance of Authorized Inspection Agencies (AIA) Accredited by the American Society of Mechanical Engineers (ASME)*, with accreditation to perform repair and alteration acceptance inspections. ~~or accredited in accordance with NB-369, Accreditation of Authorized Inspection Agencies (AIA) Performing Inservice Inspection Activities and Qualification of Inspectors of Boilers and Pressure Vessels.~~

*(Note to NBIC Secretary – The reference NBIC paragraph for Item 19-11 should be updated to reflect “NBIC Part 3, 1.6.3 a)” and the General Description revised to read “Clarify Reference to Authorized Nuclear Inspection Agencies”)*

Original Proposal – Information Only

### Item 19-11 – Hellman – 7-15-2019

**Location:** Section 9 of Parts 1, 2, 3 and 4

**Explanation of Need:** Review the use of “Authorized Nuclear Inspection Agency” within the NBIC.

**Background:** An ANIA can not be an Inservice AIA since Endorsements for nuclear inspectors are issued only to new construction AIA’s. The requirements for qualified Authorized Nuclear Inspectors/Supervisors are clearly specified in NB-263, RCI-1. Therefore revision to the Glossary definition is needed to clarify this requirement for the NR Accreditation Program.

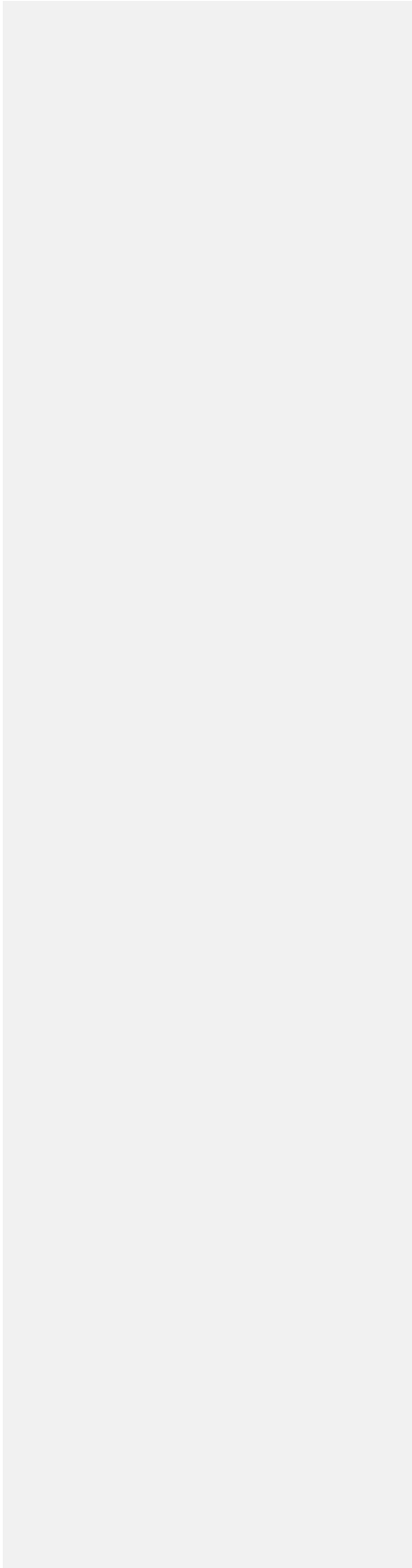
**Proposed Revision:**

#### 1.6.3 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-360, National Board Acceptance of Authorized Inspection Agencies (AIA) Accredited by the American Society of Mechanical Engineers (ASME) with authorization to perform repair and alteration acceptance inspections, or accredited in accordance with NB-369, Accreditation of Authorized Inspection Agencies (AIA) Performing Inservice Inspection Activities and Qualification of Inspectors of Boilers and Pressure Vessels.
- 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.



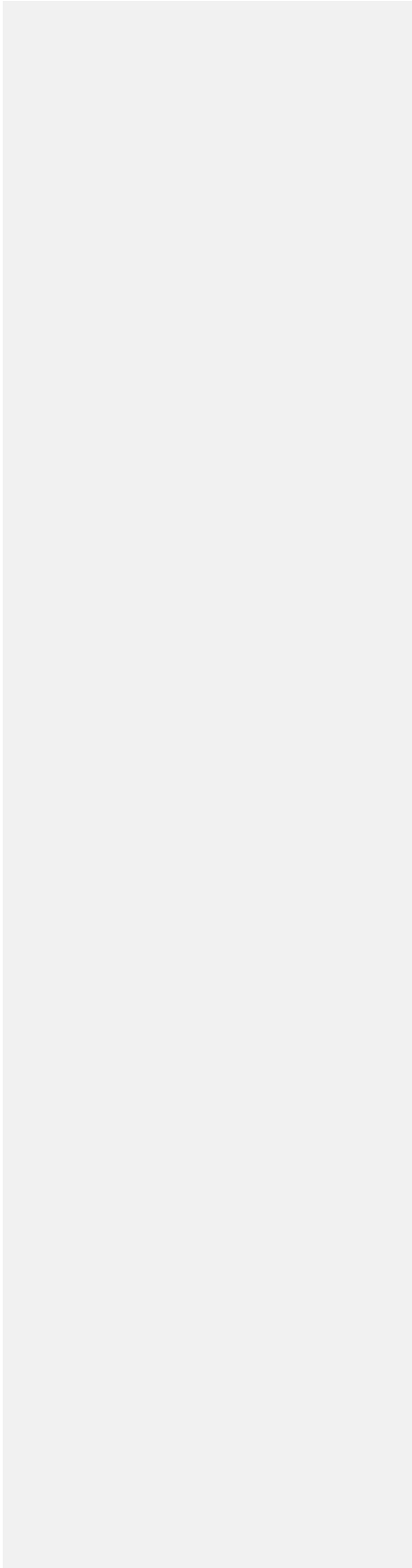


MC Negatives - Information Only

**Committee Member:** Donnie LeSage    **Vote Date:** 2019-11-19    **Vote:** Disapproved    **Uploads:** \_\_\_\_\_  
**Member Comment:** I agree with Mr. Pillow. The Background stated "Therefore revision to the Glossary definition is needed". I don't see the proposed Glossary definition change.

**Committee Member:** James Pillow    **Vote Date:** 2019-10-30    **Vote:** Disapproved    **Uploads:** \_\_\_\_\_  
**Member Comment:** I agree with the proposed revision to 1.6.3, but the proposal does not include a revision to the Glossary as indicated in the Background.

**Committee Member:** Milton Washington    **Vote Date:** 2019-11-22    **Vote:** Disapproved    **Uploads:** \_\_\_\_\_  
**Member Comment:** I agree with Mr. Pillow that the proposal should include the glossary change as well.



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

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

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

**Proposed Text:**

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

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

## SUPPLEMENT 4

### REPAIR AND ALTERATION OF FIBER-REINFORCED THERMOSETTING PLASTIC PRESSURE EQUIPMENT

#### S4.1 SCOPE

- a) This supplement provides requirements and guidelines that apply to repairs and alterations to fiber-reinforced pressure-retaining items.
- b) The letters "RP" shall be included on the "R" *Certificate of Authorization* for those organizations authorized to perform repairs/alterations of fiber-reinforced plastic pressure equipment.

#### S4.2 ~~INSPECTOR QUALIFICATIONS FOR "R" STAMP~~CERTIFICATE HOLDER DESIGNEE

The "R" Stamp Holder's ~~inspector shall have~~ shall designate an employee who will have the responsibility of verifying the repair and/or alteration activity meets the requirements of the NBIC. The designee shall have the following qualifications:

- a) No fewer than five years of current verifiable documented experience in an occupational function that has a direct relationship to Reinforced Thermoplastic (RTP) fabrication and inspection, following customer or national standards, and be directly involved in the following activities:
  - 1) the development of plans, drawings, procedures, inspection requirements, acceptance criteria, and personnel qualification requirements;
  - 2) fabrication, construction, and supervision of personnel in the production of assemblies or subassemblies;
  - 3) detection and measurement of nonconformities by application of visual or other nondestructive evaluation processes to written procedures;
  - 4) supervision of personnel engaged in material and component examination;
  - 5) repairs of equipment or supervision of personnel performing repairs;
  - 6) preparation of written procedures for assembly, acceptance, nondestructive evaluation, or destructive tests;
  - 7) qualification of secondary bonders, laminators, and welders to applicable codes, standards, or specifications;
  - 8) operation techniques or activities used to fulfill quality control requirements for RTP fabrication or assembly; and
  - 9) train the occupational skills of fabrication or assembly of RTP equipment.
- b) The ~~inspector-designee~~ shall meet the following visual and educational requirements:
  - 1) be able to read a Jaeger Type No. 1 standard chart at a distance of not less than 12 in. (305 mm);
  - 2) be capable of distinguishing and differentiating contrast between colors;
  - 3) have visual acuity checked annually to assure natural or corrected near distance vision; and
  - 4) be a high school graduate or hold a state or military approved high school equivalency diploma.

- | c) The ~~employer of the inspector~~ "R" Certificate Holder shall certify that the ~~employee-designee~~ complies with the above qualification requirements.

#### **S4.3 TOOLS**

| The following tools may be required by the ~~Inspector~~ "R" Certificate Stamp Holder's designee.:

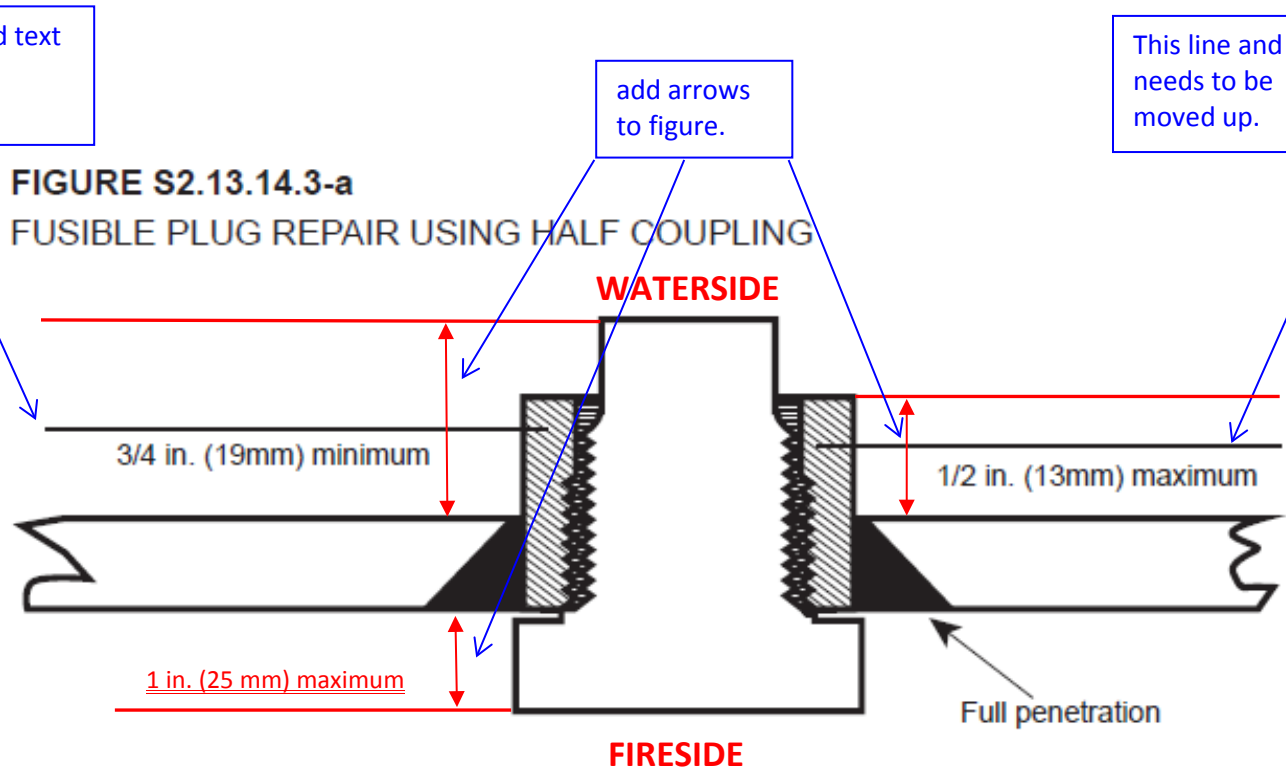
- a) adequate lighting including overall lighting and a portable lamp for close inspections;
- b) handheld magnifying glass;
- c) Barcol hardness tester;
- d) small pick or pen knife;
- e) small quantity of acetone and cotton swabs;
- f) camera with flash capability; and
- g) liquid penetrant testing kit.

#### **S4.4 LIMITATIONS**

All field work shall be limited to secondary bonding.

### S2.13.14.3 REPAIR OF FUSIBLE PLUG OPENING

- a) Threaded holes with damaged threads may be repaired by re-tapping or weld buildup and rethreading. ~~The~~ threads shall be removed prior to welding.
- b) Threaded opening with damaged threads that ~~can not~~cannot be repaired by re-tapping or re-threading should be repaired by welding a flush patch or half coupling connection to the sheet.
- c) The half coupling connection shall be such a size as to not interfere with proper operation of the fusible plug. The half coupling shall be welded flush to the fire side using a full penetration weld. The half coupling must not project higher than 1/2 inch (13 mm) from the water side (See Figure NBIC Part 3, S2.13.14.3-a).
- d) Flush patch type repairs are to be installed in accordance with S2.13.9.3 and S2.13.10.3 (See Figure S2.13.14.3-b).
- e) A fusible plug shall be of such length that when installed it shall project at least 3/4 inch (19 mm) on the water side of the plate, tube, or flue. It shall extend through the plate, tube, or flue on the fire side as little as possible but not more than 1 inch (25 mm).



## Item 19-55

7/9/2019

### Request for NBIC Part 3, Section 4 Revision

<b>Purpose</b>	To change the maximum test pressure requirement when performing liquid pressure tests of repair and alteration activities. This proposal was initially part of item NB16-2603, which proposed changes to 4.4.1 a) 1) and 4.4.2 a) 1). However, only the changes to 4.4.1 a) 1) made it into the 2019 NBIC.
<b>Scope:</b>	To revise paragraph 4.4.2 a) 1) of the NBIC Part 3 to require maximum liquid test pressure be in accordance with the original construction Code.
<b>Background</b>	<p>For liquid pressure testing of repairs and alterations, paragraph 4.4.2(a)(1) of the NBIC Part 3 require a maximum test pressure of 150% of the maximum allowable working pressure (MAWP) stamped on the pressure retaining item, as adjusted for temperature.</p> <p>However, repairs and alterations of DOT vessels are required to be tested at a <u>minimum</u> of 150% of design pressure which makes it virtually impossible to comply with the NBIC maximum requirement.</p> <p>Further, repairs and alterations to DOT ammonia transport vessels made from UHT materials require a test pressure of 200% of design pressure (49CFR 180.413(b)(6) and 177.337-16). Obviously, this is in violation of the NBIC Part 3.</p> <p>Paragraph UG-99 of ASME Section VIII, Div. 1 does not not specify a maximum test pressure for hydrostatic tests. Therefore, it is p[roposed that paragraph 4.4.2(a)(1) be revised to <u>remove</u> the maximum test pressure of 150% of MAWP. The paragraph will have new wording (similar to existing paragraph 4.4.1(b) for pneumatic testing) which states test pressure shall not to exceed the maximum test pressure of the original code of construction.</p>
<b>Proposed Revision</b>	See page 2 for proposed revisions.



## EXISTING PARAGRAPH 4.4.2(a)(1) of NBIC Part 3

### **4.4.2 TEST OR EXAMINATION METHODS APPLICABLE TO ALTERATIONS**

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

#### a) Liquid Pressure Test

Pressure testing of alterations shall meet the following requirements:

- 1) A pressure test as required by the original code of construction shall be conducted. ~~The test pressure shall not exceed 150% of the maximum allowable working pressure (MAWP) stamped on the pressure retaining item, as adjusted for temperature.~~ When the original test pressure included consideration of corrosion allowance, the test pressure may be further adjusted based on the remaining corrosion allowance. The pressure test for replacement parts may be performed at the point of manufacture or point of installation;

## PROPOSAL OF REVISION TO 4.4.2(a)(1)

- 1) A pressure test as required by the original code of construction shall be conducted. The test pressure shall not exceed the maximum liquid test pressure of the original code of construction. When the original test pressure included consideration of corrosion allowance, the test pressure may be further adjusted based on the remaining corrosion allowance. The pressure test for replacement parts may be performed at the point of manufacture or point of installation.

## 19-59 – Edwards – 12-23-19

**Background** – This Item is a proposed revision to Part 3, 3.2.2 e), as a result of an intent interpretation request under Item 19-34. The proposed interpretation was unanimously approved by SC-R/A but withdrawn at Main Committee pending action on a corresponding code revision. The original request and supporting information by the Inquirer are attached.

**Proposed Action** – Revise Part 3, 3.2.2 e), as follows:

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

INFORMATION ONLY

<b>Inquiry No.</b>	<b>19</b>
<b>Source</b>	GE
<b>Subject</b>	NB
<b>Edition</b>	20
<b>Question</b>	NB pre an hyc the det
<b>Reply</b>	Ye:
<b>Committee's Question</b>	NB pre 3.2 the
<b>Committee's Reply</b>	Ye:
<b>Rationale</b>	AS do: Ba: cor rec rev Thi cla pre wh par
<b>SC Vote</b>	
<b>NBIC Vote</b>	
<b>Negative Vote Comments</b>	

**INFORMATION ONLY**

**Background Materials Submi**

NBIC Part 3 Section 3 paragraph test as required by the original consistently by all users of the original code of construction." ASME issued interpretation that does not contain requirements for the test, the words "... as required by the original code of construction" testing of the parts is not required. I think that was the Committee's interpretation and proposed revision "original code of construction" to be required when the original code

Proposed Intent Interpretation:  
Question: NBIC Part 3 paragraph required by the original code of construction does not provide rules for hydrostatic test (intent of 3.2.2 e) that the referee requires for the test pressure?  
Reply: Yes.

Associated Revision:  
e) Replacement parts address pressure determined for the code of construction original code of construction. If ~~the original code of construction~~ code of construction pressure test provision one or a combination of the existing code or 4.4.2 (for alterations). The R section of the R Form the examination tested at the pressure determined for the code of construction.

Background Information:

NBIC Part 3 Section 3 paragraph

- e) Replacement parts address original code of construction original code of construction code of construction pressure test provision accept the use of one of the existing code Section 4, paragraph 4.4.1 (for alterations) for completing the R Form statement test(s) performed, and the referee requires for the test code of construction.

**ASME Interpretation I-16-6**

Standard Designation: BPV 1  
Edition/Addenda: 2015  
Para./Fig./Table No: PW-54  
Subject Description: Section I latest Interpretation  
Date Issued: 08/16/2016  
Record Number: 13-942  
Interpretation Number: BPV I-16-6  
Question(s) and Reply(ies): Question: Is it intended for use in the interpretation regarding hydrostatic test or alteration of existing code of construction?  
Reply: No. Section I does not apply to Existing Boilers.

**INFORMATION ONLY**

2017 Addition to PW-54

**PW-54.4** Refer to *A-64* as guidance for welded pressure parts supplied to the user of an existing boiler as replacement or repair parts. (17)

A-64

**A-64 REPAIRS TO EXISTING BOILERS**

Where repairs are necessary that in any way affect the working pressure or safety of a boiler, a state inspector, municipal inspector, or an inspector employed regularly by an insurance company, which is authorized to do a boiler insurance business in the state in which the boiler is used, shall be called for consultation and advice as to the best method of making such repairs; after such repairs are made they shall be subject to the approval of a state inspector, municipal inspector, or an inspector regularly employed by an insurance company that is authorized to do a boiler insurance business in the state in which the boiler is used.

## Recommendation

NBIC Part 3 - Item #: 19-48

### Calibration:

#### 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.

At a minimum it shall include:

A) A Calibration System shall include the following:

1. Examination, measuring, and test equipment, subject to calibration, shall have a unique identification number and a calibrated date as well as a specified next calibration due date.
2. The methodology of how the various equipment will be calibrated.
3. The person(s) responsible for the calibration of the equipment.
4. A statement that all calibrations will be traceable to the National Institute of Standards and Technology (NIST) or another nationally recognized Standards Organization, as much as practical.
5. A calibration record retention policy.

NR Task Group “NR”  
Task Group 19-69

**CURRENT TEXT**

**5.12.5.1**

8) Identify the original construction code, edition/addenda used for the system or component identified in line 4.

**PROPOSED REVISION**

**5.12.5.1**

8) Identify the original construction code, section, edition/addenda and applicable code cases used for the system or component identified in line 4.

**CURRENT TEXT**

**5.12.5.1**

11) Identify code edition/addenda used for design, when applicable.

**PROPOSED REVISION**

**5.12.5.1**

11) Identify code section, edition/addenda and applicable code cases used for design, when applicable.

**CURRENT TEXT**

5.12.5.1

23) Identify Code section year and/or addenda used to perform work.

**PROPOSED TEXT**

5.12.5.1

23) Identify Code section ~~year~~ edition and/or addenda used to perform work.

WORK PERFORMED BY:									
①									
_____ (Name of "NR" certificate holder)									
_____ (Address of "NR" certificate holder)									
COMPONENT IDENTIFICATION							<u>Edition/</u>		
No.	Type of Item	Mfg. Name	Serial No.	Nat'l Bd No.	Code Class	Code Section	<del>Year/</del> Addenda	Code Case	
⑩⑥	⑩⑦	⑩⑧	⑩⑨	⑩⑩	⑩⑪	⑩⑫	⑩⑬	⑩⑭	



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

Terrence Hellman  
National Board  
[thellman@nationalboard.org](mailto:thellman@nationalboard.org)  
614-431-3234

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

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

#### h) Repair and Alteration Methods

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

#### i) Materials

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

#### j) Method of Performing Work

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

#### k) Welding, NDE and Heat Treatment

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

## Item 19-91: Request for Revision to NBIC Part 3, 5.6

<b>Purpose</b>	Many "R" Certificate Holders now register R Forms in the National Board Electronic Data Transfer (EDT) System. The EDT system contains all of the required log information listed in paragraph 5.6 of Part 3, which makes it unnecessary and redundant for the "R" Cert. Holder to maintain a separate log.
<b>Scope:</b>	Part: Repairs and Alterations; Section: 5; Paragraph: 5.6
<b>Background:</b>	NBIC Part 3, paragraph 5.6 requires "R" Certificate Holders to maintain a log documenting all Forms registered with the National Board. The information required to be in the log are the the form's unique registration number, description of work performed, date of AIA acceptance, and date the report was submitted to the National Board.
<b>Proposed Revision:</b>	See below for the proposed revision.

### 5.6 FORM REGISTRATION LOG

"R" or "NR" Certificate Holders shall maintain a log or multiple logs documenting unique and sequentially numbered Form "R" Reports that are registered with the National Board. The logs shall include, as a minimum, each form's unique registration number, type (R-1, R-2, NR-1, etc.), description of work performed, date of acceptance by the Authorized Inspection Agency, and date the report was submitted to the National Board. As an alternative to the above requirement, the log may be maintained electronically in the National Board Electronic Data Transfer (EDT) System.

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#### Electronic Data Transfer



#### What Is EDT?

EDT is the National Board's Electronic Data Transfer System. It is an interactive document management system that both simplifies and expedites the process of registering data reports, conveniently accomplished through the Internet. The entire process is completed electronically with just a few clicks of a button.

#### EDT Home Page

After a National Board EDT Account has been established, a user simply enters the EDT website to begin the registration process.

Once logged in, users are greeted by their EDT home page which verifies their company name as well as the name of the individual logged into the site.

This page also provides each authorized individual:

- up-to-date system announcements;
- a selection of menu options which allows the user to create new data reports, browse reports in various stages of the filing process, as well as several other options;
- access to your files 24 hours a day, 7 days a week; and
- the capability to meet the log requirements of NB-264, *Criteria for Registration* for manufacturing organizations, and the requirements of the NBIC for Form Registration Logs for R Certificate Holders.



# National Board EDT System

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43 Filed Repair Report(s)

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REPAIR NO.	DATE	FORM	MFG. SERIAL NO.	DRAWING NO.	
<a href="#">R43</a>	<a href="#">7/10/2019</a>	<a href="#">R2</a>	<a href="#">22480</a>		
<a href="#">R42</a>	<a href="#">7/10/2019</a>	<a href="#">R2</a>	<a href="#">20687</a>		
<a href="#">R41</a>	<a href="#">6/5/2019</a>	<a href="#">R2</a>	<a href="#">19680</a>		
<a href="#">R40</a>	<a href="#">6/5/2019</a>	<a href="#">R2</a>	<a href="#">129</a>		
<a href="#">R39</a>	<a href="#">6/5/2019</a>	<a href="#">R2</a>	<a href="#">22234</a>		
<a href="#">R38</a>	<a href="#">5/3/2019</a>	<a href="#">R2</a>	<a href="#">20650</a>		
<a href="#">R37</a>	<a href="#">1/22/2019</a>	<a href="#">R2</a>	<a href="#">19475</a>		
<a href="#">R36</a>	<a href="#">1/22/2019</a>	<a href="#">R2</a>	<a href="#">107893</a>		
<a href="#">R35</a>	<a href="#">1/16/2019</a>	<a href="#">R2</a>	<a href="#">120083</a>		
<a href="#">R34</a>	<a href="#">11/13/2018</a>	<a href="#">R2</a>	<a href="#">156</a>		
<a href="#">R33</a>	<a href="#">2/5/2018</a>	<a href="#">R2</a>	<a href="#">160</a>		
<a href="#">R32</a>	<a href="#">2/5/2018</a>	<a href="#">R2</a>	<a href="#">117259</a>		
<a href="#">R31</a>	<a href="#">11/28/2017</a>	<a href="#">R2</a>	<a href="#">73821</a>		
<a href="#">R30</a>	<a href="#">8/9/2017</a>	<a href="#">R2</a>	<a href="#">117413</a>		
<a href="#">R29</a>	<a href="#">7/18/2017</a>	<a href="#">R2</a>	<a href="#">12208</a>		
<a href="#">R28</a>	<a href="#">10/9/2017</a>	<a href="#">R2</a>	<a href="#">A4516</a>		
<a href="#">R27</a>	<a href="#">6/22/2017</a>	<a href="#">R2</a>	<a href="#">A-2002</a>		
<a href="#">R26</a>	<a href="#">5/9/2017</a>	<a href="#">R2</a>	<a href="#">11006-2</a>		
<a href="#">R25</a>	<a href="#">1/25/2017</a>	<a href="#">R2</a>	<a href="#">67582</a>		
<a href="#">R24</a>	<a href="#">1/16/2017</a>	<a href="#">R2</a>	<a href="#">21250</a>		

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Click on any of the above line items to view the data report in detail, or:

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**Item 19-92: Request for Revision to NBIC Part 3, Table 2.3**

<b>Purpose</b>	Add column and titles to Part 3, Table 2.3 for clarification.
<b>Scope:</b>	Part: Repairs and Alterations; Section: 2; Table 2.3
<b>Background:</b>	“Document Designation” is the name used by AWS Technical.
<b>Proposed Revision:</b>	See below for the proposed revision.

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<b>GMAW – Gas Metal Arc Welding</b>	
Standard Welding Procedure Specification for Argon Plus 25% Carbon Dioxide Shielded Gas Metal Arc Welding (Short Circuiting Transfer Mode) followed by Argon Plus 2% Oxygen Shielded Gas Metal Arc Welding (Spray Transfer Mode) of Carbon Steel (M-1/P-1/S-1, Groups 1 and 2), 1/8 in. (3.2 mm) through 1 ½ in. (38 mm) Thick, ER70S-3, Flat Position Only, As-Welded or PWHT Condition, Primarily Pipe Applications.	B2.1-1-233: 2006
Standard Welding Procedure Specification for Argon Plus 2% Oxygen Shielded Gas Metal Arc Welding (Spray Transfer Mode) of Carbon Steel (M-1/P-1/S-1, Groups 1 and 2), 1/8 in. (3.2 mm) through 1 ½ in. (38 mm) Thick, ER70S-3, Flat Position Only, As-Welded or PWHT Condition, Primarily Pipe Applications.	B2.1-1-235: 2006
<b>GTAW/SMAW Combination of Welding Processes</b>	
<u>TITLE</u>	<u>DESIGNATION</u>
Standard Welding Procedure Specification for Gas Tungsten Arc Welding Followed by Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 in. (3.2 mm) through 1 ½ in. (38 mm) Thick, ER70S-2 and E7018, As-Welded or PWHT Condition.	B2.1-1-021-94 and B2.1-1-021-94R
Standard Welding Procedure Specification for Gas Tungsten Arc Welding followed by Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Groups 1 or 2), 1/8 in. (3.2 mm) through 3/4 in. (19 mm) Thick, ER70S-2 and E7018, As-Welded or PWHT Condition, Primarily Pipe Applications.	B2.1-1-209-96
Standard Welding Procedure Specification for Gas Tungsten Arc Welding followed by Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Groups 1 or 2), 1/8 in. (3.2 mm) through 1 ½ in. (38 mm) Thick, ER70S-2 and E7018, As-Welded or PWHT Condition, Primarily Pipe Applications.	B2.1-1-209-96 (R2007)
Standard Welding Procedure Specification for Gas Tungsten Arc Welding (Consumable Insert) Followed by Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 in. (3.2 mm) through 3/4 in. (19 mm) Thick, INMs1 and E7018, As-Welded or PWHT Condition, Primarily Pipe Applications.	B2.1-1-211-96
Standard Welding Procedure Specification for Gas Tungsten Arc Welding with Consumable Insert Root Followed by Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 in. (3.2 mm) through 1 ½ in. (38 mm) Thick, INMs-1, ER70S-2, and E7018 As-Welded or PWHT Condition, Primarily Pipe Applications.	B2.1-1-211:2001 R2012
<b>GMAW/FCAW – Combination of Welding Processes</b>	
Standard Welding Procedure Specification for Argon Plus 25% Carbon Dioxide Shielded Gas Metal Arc Welding (Short Circuiting Transfer Mode) Followed by Argon Plus 25% Carbon Dioxide Shielded Flux Cored Arc Welding of Carbon Steel (m-1/P-1/S-1, Groups 1 and 2), 1/8 in. (3.2 mm) through 1 ½ in. (38 mm) Thick, ER70S-3 and EXT-X, As-Welded or PWHT Condition, Primarily Pipe Applications.	B2.1-1-232:2006

**Austenitic Stainless Steel — (M8/P8/S8 Materials)**

<b>SMAW — Shielded Metal Arc Welding</b>	
Standard Welding Procedure Specification for Shielded Metal Arc Welding of Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 in. (3.2 mm) through 1½ in. (38 mm) Thick, As-Welded Condition.	B2.1-8-023-94

New Item: Item # \_\_\_\_\_; Update NBIC Part 3, Table 2.3 (2019 Edition) adding the following listed SWPSs

**PROPOSED REVISION**

Revise Table 2.3 with the addition of the following listed Revised SWPS's.

**TABLE 2.3**

<b><u>*Title</u></b>	<b><u>*Designation</u></b>
Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8" [3 mm] through 3/4 inch [19 mm] Thick, E6010 (Vertical Uphill) Followed by E7018 (Vertical Uphill), in the As-Welded Condition, Primarily Pipe Applications.	<b><u>B2.1-1-201: 2019</u></b>
Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8" [3 mm] through 3/4 inch [19 mm] Thick, E6010 (Vertical Downhill) Followed by E7018 (Vertical Uphill), in the As-Welded Condition, Primarily Pipe Applications.	<b><u>B2.1-1-202: 2019</u></b>
Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8" [3 mm] through 3/4 inch [19 mm] Thick, E6010 (Vertical Uphill), in the As-Welded Condition, Primarily Pipe Applications.	<b><u>B2.1-1-203: 2019</u></b>
Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8" [3 mm] through 3/4 inch [19 mm] Thick, E6010 (Vertical Downhill Root with the Balance Vertical Uphill), in the As-Welded Condition, Primarily Pipe Applications.	<b><u>B2.1-1-204: 2019</u></b>
Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8" [3 mm] through 1 - 1/2 inch [38 mm] Thick, E6010 (Vertical Uphill) Followed by E7018 (Vertical Uphill), in the As-Welded Condition or PWHT Condition, Primarily Pipe Applications.	<b><u>B2.1-1-205: 2019</u></b>
Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8" [3 mm] through 1 - 1/2 inch [38 mm] Thick, E6010 (Vertical Downhill) Followed by E7018 (Vertical Uphill), in the As-Welded Condition or PWHT Condition, Primarily Pipe Applications.	<b><u>B2.1-1-206: 2019</u></b>
Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8" [3 mm] through 1 - 1/2 inch [38 mm] Thick, ER70S-2, in the As-Welded Condition or PWHT Condition, Primarily Pipe Applications.	<b><u>B2.1-1-207: 2019</u></b>
Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8" [3 mm] through 1 - 1/2 inch [38 mm] Thick, E7018, in the As-Welded Condition or PWHT Condition, Primarily Pipe Applications.	<b><u>B2.1-1-208: 2019</u></b>

Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding Followed by Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8" [3 mm] through 1 - 1/2 inch [38 mm] Thick, ER70S-2 and E7018, in the As-Welded Condition or PWHT Condition, Primarily Pipe Applications.

**B2.1-1-209: 2019**

- **Info only pending adoption of Item 19-92**