Date Distributed: December 17, 2012

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

SUBCOMMITTEE ON INSPECTION

AGENDA

Meeting of January 16, 2013
Mobile, Alabama

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

1. **Call to Order – 8:00 a.m.**

2. **Announcements**

3. **Adoption of the Agenda**

4. **Approval of Minutes of July 18, 2012**

5. **Review of the Roster (Attachment 1)**

   Mr. Don Cook was elected to serve as the NBIC Committee Chairman at the July 2012 meeting and he is no longer eligible to serve as the Chair of the SC on Inspection. Two members of the SC on Inspection, Mark Mooney and Venus Newton have expressed an interest in serving as the subcommittee Chair. If any other committee members are interested in being elected, please volunteer at this time. A vote will be taken.

   The following members of the SG on Inspection General are eligible for reappointment: Messrs. Venus Newton and Mark Mooney. A vote will be taken.

   Dr. Marshall Clark is eligible for reappointment to the SG on Inspection Specific. A vote will be taken.

   Mr. Paul Welch, Authorized Inspection Agency, would like to become a member of both the SG on Inspection General and the SG on Inspection Specific. Please view his attached resume. A vote will be taken. (Attachment 1, p. 2)

6. **Public Review Comments (Attachment 2)**

   PR13-0208 ***Part 2, 2.3.6.5 b)2) SC on Inspection*** -The hydrostatic relief valve is not part of the nurse tank but is in the plumbing and typically mounted pm the toolbar. Also it is bad practice to mount a valve on a valve in these types of applications without support for the valves. Why the high set pressure for this valve? The pressure relief valve (set pressure around 250 psi) will have vented preventing the pressure in the vessel from reaching the set pressure of the hydrostatic relief valve. (Attachment 2, p. 1)

   PR13-0209 ***Part 2, 2.2.10.6 SC on Inspection*** -The NBIC is supposed to be a safety code so why is a good practice only a good practice if required by a jurisdiction. For example, 2.2.10.6 a) is or is not that paragraph a good practice? A Jurisdiction only makes a good practice mandatory but without the jurisdictional requirement a good practice is optional with the owner/user. This section should be revised to indicate "good practices" should be complied with but are mandatory when required by the jurisdiction. (Attachment 2, p. 2)

   PR13-0210 ***Part 2, S2.10.6 h) SC on Inspection***-Revise h) On forced circulation boilers the flow sensing device shall be tested to verify the boiler shuts down on loss of flow. (Attachment 2, p. 3)

   PR13-0211 ***Part 2, 2.3.6.5 b) 1) SC on Inspection*** - How is intended service of a tank determined when the service is not marked on the nameplate, and most likely is not listed on the Manufacturer's Data Report. Further, what does welding have to do with a missing or illegible nameplate? Also, the paragraph states welding is prohibited, but the next sentence indicates post construction welding is permitted. The paragraph is confusing and contradictory. Please revise. (Attachment 2, p. 4)

   PR13-0212 ***Part 2, 2.3.6.5 b) 4) SC on Inspection*** - Z87 rated goggles: List the rating organization and the full identification of the specification. (Attachment 2, p. 5)

   PR13-0213 ***Part 2, 2.3.6.7 a) SC on Inspection-*** Change "must" and "should" to "shall". (Attachment 2, p. 6)

PR13-0214 ***Part 2, 2.3.6.7 a) 3) SC on Inspection*** - Change "should" to "shall". The vessel will not be in operation during an inspection so I don't understand how this requirement can be verified. This is an operational requirement and should not be in Part 2 of the NBIC. (Attachment 2, p. 7)

PR13-0215 ***Part 2, 2.3.6.7 a) 4) SC on Inspection*** - Change "should" to "shall". (Attachment 2, p. 8)

PR13-0216 ***Part 2, 2.3.6.7 b)2) & 3) SC on Inspection*** - Change "should" to "shall". In many cases, these are lifesaving vessels. The owner/operator should be told in strong terms the vessel needs to be in excellent condition. Should indicates "when you get around to it, minor inconvenience." (Attachment 2, p. 9)

PR13-0217 ***Part 2, 2.3.6.7(b)(4) SC on Inspection*** -Change "should" to "shall" Also, if the opening is for exhaust, then it is an outlet for the vessel. How is this inspection to be accomplished? Are there grates over the outlets? (Attachment 2, p. 10)

7. **Inquiries (Attachment 3)**

IN12-0201 ***Part 2, 5.2 SC on Inspection*** - Q:If a National Board Commissioned Inspector has verified the replacement of stamped data or nameplate by an "R" Certificate Holder on Corrugated rolls that are not stationary and subject to operation in multiple Jurisdictions, possibly by multiple owners, is the application of an NB-136"Replacement of Stamped Data" form required? A: No, if performed by an "R" Certificate holder and verified by an National Board Commissioned Inspector the responsibility of traceability and nameplate accuracy is on the Certificate Holder similar to nameplate replacement in NBIC Part 3, 5.5.9.5. (Attachment 3, pp. 1-7)

A Task Group consisting of M. Mooney (Lead), R. Dobbins, T. Barker, D. Canonico, and Daren Daily was assigned.

IN12-0202 ***Part 2, 5.2 SC on Inspection*** – Q: Can an NB-136 "Replacement of Stamped Data Form" which is required to be signed by a National Board Commissioned Inspector, for Corrugated Rolls that are not stationary and subject to operation in multiple Jurisdictions, possibly by multiple owners, be filed with The National Board and copied to the applicable Jurisdiction in lieu of obtaining an approval signature from the Jurisdiction? A: Yes, the approval from one Jurisdiction should not be incumbent on any other Jurisdiction due to transient nature of Corrugated Roll Pressure Equipment. Similarly, if there was no Jurisdiction in the location of installation another Jurisdiction would be compelled to accept National Board filing if the equipment is moved. (Attachment 3, pp. 1-7)

A Task Group consisting of M. Mooney (Lead), R. Dobbins, T. Barker, D. Canonico, and Daren Daily was assigned.

8. **Action Items (Attachment 4)**

NB07-0910 ***Part 2 S6 SG Inspection Specific***- Review DOT supplement. A task group of S. Staniszewski (Chair), G. McRae and J. Riley has been assigned. This specific supplement should be reviewed by TG for completeness and accuracy. (No Attachment)

<u>July 2007</u>

A progress report was given. Changes to the DOT glossary were approved previously due to approved public review comments.

January 2008

A progress report was given. The task group has met twice to discuss the public review comments received from the 2007 edition and in the process 11 more issues were identified.

July 2008

A progress report was given.

January 2009

A progress report was given. An advanced notice of proposed rulemaking by the D.O.T. under Docket # PHMSA 2005-21351 is scheduled to be released by June 30, 2009.

July 2009

A progress report was given. Mr. Staniszewski reported that the docket did not make its release date.

January 2010

A progress report was given.

July 2010

Mr. Staniszewski gave a progress report. The document is currently under review from the legal department. At the end of the year there will be an advance notice of rulemaking.

January 2011

A progress report was given.

July 2011

Mr. Cook presented a progress report that was sent by Stan Staniszewski. The DOT has the rule making package in process right now of being approved and Stan is limited to what he can legally discuss. Stan will keep us abreast to any developments.

January 2012

A progress report was given by Mr. Staniszewski.

July 2012

A progress report was given by Mr. Cook.

January 2013

Mr. Staniszewski (if present) is expected to report.

NB08-0321 ***Part 2 1.5 SG on Inspection Specific*** **-** In paragraph 1.5 Inspection Activities, add verbiage to address change of service for a pressure vessel. These requirements should caution inspectors, owners, and jurisdictional authorities of the inherent dangers involved when changing service. A new supplement or new Subject under 2.3.6, Description and Concerns of Specific Types of Pressure Vessels, should be added to address the specific requirements for inspection of pressure vessels that have been converted from one service to another. A Task Group of all three parts of the NBIC has been formed under the leadership of Bob Wielgoszinski. Task group members from Inspection are G. McRae (Chair), R. Reetz, R. Wacker, D. Cook, and J. Getter. It was noted that some wording exists in Part 2 1.5.2 (a, 2.3.5.4 b)5 and 2.3.2 b) that deals with service conditions. (Attachment 4, pp. 1-6)

July 2008

A task group was assigned.

January 2009
A progress report was given.

July 2009
A progress report was given.

January 2010
A progress report was given.

July 2010
A progress report was given.

January 2011
A progress report was given.

July 2011
A progress report was given by Mr. Cook. The Task Group met and is developing wording.

January 2012
A progress report was given by Mr. Wielgoszinski. The Task Group working on NB08-0321, NB08-0701 & NB08-0703 met. A letter ballot will be forthcoming.

July 2012
A progress report was given by Mr. Cook on a proposed Supplement 9. A straw poll was taken of the Sub-Committee. The majority supported inclusion of the text into a new paragraph 1.6 in lieu of a new Supplement 9.

January 2013
Mr. Wielgoszinski is expected to report.

NB08-0701 ***Part 2 S7 SG on Inspection Specific*** **-** Add a requirement for change of service from above ground to below ground installations of LPG tanks. We also need requirements for how to inspect these tanks. A task group of G. McRae (Chair), G. Galanes, J. Getter, M. Huffman, V. Mullins, J. Riley D. Cook, J. Richardson and V. Newton has been assigned. (Attachment 4, pp. 7-15)

January 2008
A progress report was given and a task group was assigned.

July 2008
A progress report was given.

January 2009
A progress report was given. This action item will be worked on simultaneously with the task group assigned to NB08-0320, NB08-0321 and NB08-0322.

July 2009
A progress report was given.

January 2010
No progress at this time.

July 2010
A progress report was given.

January 2011
A progress report was given.

July 2011
A progress report was given by Mr. Cook. The Task Group met and is developing requirements.

January 2012
A progress report was given by Mr. Wielgoszinski. The Task Group working on NB08-0321, NB08-0701 & NB08-0703 met. A letter ballot will be forthcoming.

July 2012
A report was given by Mr. Mullins. After discussion, a motion was made to accept the proposal. The motion was unanimously approved. This item was approved to go out for letter ballot to the NBIC Committee. The ballot failed.

January 2013
Mr. McRae is expected to report.

NB10-0601 ***Part 2, SC S6, SG on Fiber Reinforced Plastic-*** Inspection of high pressure composite vessels. (Attachment 4, pp. 16-42)

July 2011
A letter ballot was sent to the SC in May but it was taken back by the subgroup before its closure. There were a lot of comments by SC members that they were unfamiliar with these types of vessels.

January 2012
An informational presentation was presented by Mr. Doug Eisberg on high pressure composite vessels. Mr. Eisberg addressed some of the concerns raised during a letter ballot. Mr. Eisberg is a member of NBIC FRP Sub-Committee and ASME SC X.

July 2012
An informational report was given by Mr. Francis Brown.

January 2013
A report is expected.

NB11-0201 ***Part 2, S2 SG on Historical Boilers*** **-** Limits for bulged stayed firebox sheets. A task group of R. Bryce, D. Cook and F. Johnson has been assigned. (No Attachment)

July 2010
A task group of R. Bryce (Chair), D. Cook and F. Johnson was assigned.

January 2011
A progress report was given.

July 2011
Mr. Cook gave a progress report. Finite Element Analysis (FEA) is being considered as a tool for establishing limits.

January 2012
A progress report was given by Mr. Reetz and Mr. Cook.

July 2012
A progress report was given by Mr. Reetz and Mr. Cook.

January 2013
Mr. Reetz is expected to report.

NB11-0204 ***Part 2 & 3, S2 SG on Historical Boilers***-Review NDE requirements of stayed areas. A task group of M. Wahl (Chair), J. Larson and F. Johnson has been assigned. (No Attachment)

July 2010
A task group of M. Wahl (Chair), J. Larson and F. Johnson was assigned.

January 2011
A progress report was given.

July 2011
No progress.

January 2012
A progress report was given by Mr. Reetz and Mr. Cook.

July 2012
A progress report was given by Mr. Reetz.

January 2013
Mr. Reetz is expected to report.

NB11-1101 ***Part 2, S2.6.2 b), SG on Historical Boilers*** **-** This section should be revised to provide more guidelines for evaluating local pitting corrosion versus general corrosion. (Attachment 4, pp. 43-44)

January 2011
A progress report was given.

July 2011
A progress report was given by Mr. Reetz. No progress.

January 2012
A progress report was given by Mr. Cook. Looking at Local Thin Areas described in Section VIII and Section I.

July 2012
A progress report was given by Mr. Reetz.

January 2013
Mr. Reetz is expected to report.

NB12-1501 Part 2, ***SG Inspection General*** Review inspection requirements so as to align with installation requirements in Part 1. (No Attachment)

July 2012
A Task group of V. Newton, M. Horbaczewski, J. Daiber and J. Safarz was assigned.

January 2013
Mr. Newton is expected to report.

NB12-1801 ***Part 2, 5.5.2 - 5.5.3 SG Inspection Specific*** Replacement of stamping during inservice inspection. (Attachment 4, pp. 45- 53)

July 2012
A Task Group consisting of M. Mooney (Chair), R. Dobbins, T. Barker, D. Canonico, and Daren Daily was assigned.

January 2013
Mr. Mooney is expected to report.

NB13-0601 ***Part 2, 4.4.7 and 4.4.8, SG Inspection General*** List item "j" in part be relocated to 4.4.8.7 Evaluating Pressure Retaining Items Containing Local thin areas, with the relocated text place between current list item "e" and "f" of section 4.4.8.7 with the existing list items following this insert then re-designated as list items "g" and "h" respectively. (Attachment 4, pp. 54-59)

January 2013
A report is expected.

NB13-0701 ***Part 2 4.4.7 j) 1) SG Inspection General*** Revise wording to clarify the rule in this section. (Attachment 4, p. 60)

January 2013
A report is expected.

9. New Business

10. Future Meetings

July 15-19, 2013, Columbus, Ohio
January 13-16, 2013, San Antonio, Texas

11. Adjournment

Respectfully Submitted,

Bill Smith
Secretary
:rh

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ATTACHMENT 1

SC on Inspection

Member	Title	ExpirDate	Interest Category
Barker, Timothy		1/31/2015	Auth Inpection Agencies
Canonico, Dr. Domenic A.		8/31/2015	General Interest
Getter, Jim		8/31/2015	Manufacturer
Horbaczewski, Mark		8/31/2015	Users
McRae, Greg		8/31/2015	Manufacturer
Mooney, Mark		8/31/2015	Auth Inpection Agencies
Newton, Venus		7/31/2013	Auth Inpection Agencies
Pate, Ralph		2/28/2014	Jurisdictional Authorities
Reetz, Robert		7/31/2013	Jurisdictional Authorities
Richardson, John		8/31/2015	Manufacturer
Riley, Jim		8/31/2015	Users
Safarz, Jason		7/21/2013	General Interest
Schwartzwalder, Mike		8/31/2015	NB Certificate Holders
Smith, Bill	Secretary		
Staniszewski, Jr., Stanley	Vice Chair	8/31/2015	Regulatory Authorities
Total Members:	**14**		

1

Paul Welch
2530 Trotters Lane
Social Circle, GA 30025
(770) 464-4380

Objective:

To serve on the National Board Inspection Code (NBIC) Subcommittee and Subgroup General for Inspection (Part 2)

Education:

Fall Mountain Regional High School, 1970 Diploma
Dekalb Technical College, 1994

Experience:

Arise Boiler Inspection and Insurance Company
Territorial Supervisor, 7/2012 to Present

Georgia Department of Labor, Safety Engineering
Director, 3/2010 to 6/2012
National Board Inspection Code (NBIC) Main Committee
National Board Inspection Code (NBIC) Subgroup and Subcommittee for Installation (Part 1)
Acting Director, 9/2009 to 3/2010
ASME/NB Team Leader, 10/1999 to 6/2012
Safety Inspector Supervisor II, 2/2005 to 9/2009
Safety Inspector Supervisor I, 9/2001 to 2/2005
Boiler/Elevator/Amusement Ride Inspector, 3/1993 to 9/2001

Norfolk Southern Railroad
Electrician, 1/1991 to 2/1993

United States Navy
Electrician EMCM (SW), 7/6/1970 to 9/30/1990
Gas Turbine Engineering Officer of the Watch (EOOW)
1200 PSI Engineering Officer of the Watch (EOOW)
Senior Enlisted Steam Engineer School
400 PSI Engineering Officer of the Watch (EOOW)
Automated Propulsion Operator
Burner man

References:

Available upon Request

(2) 1/1

ATTACHMENT 2

National Board of Boiler and Pressure Vessel Inspectors

National Board Inspection Code

Submission of Public Review Comment
2013 Draft Edition

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Comments Must be Received No Later Than: December 17, 2012

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

Date: 12/11/12

Commenter Name: Francis Brown

Commenter Address: 1055 Crupper Avenue
Columbus, OH 43229

Commenter Phone: 614-431-3226

Commenter Fax: 614-431-3208

Commenter Email: fbrown@nationalboard.org

Section/Subsection Referenced: Part 2: 2.3.6.5(b)(2)

Comment/Recommendation: *Proposed Solution:* ☐ New Text ☒ Revise Text ☐ Delete Text

The hydrostatic relief valve is not part of the nurse tank but is in the plumbing and typically mounted on the toolbar. Also, it is bad practice to mount a valve on a valve in these types of applications without support for the valves. Why the high set pressure for this valve? The pressure relief valve (set pressure around 250 psi) will have vented preventing the pressure in the vessel from reaching the set pressure of the hydrostatic relief valve.

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard _____

Submit Form To: Robin Hough, Secretary, NBIC Committee, The National Board of Boiler & Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, fax 614-847-1828, email, rhough@nationalboard.org

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Commenter No. Issued: PR13-02

Comment No. Issued: 08

Committee Referred To:
SC Inspection

(1)

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Commenter Email: fbrown@nationalboard.org

Section/Subsection Referenced: Part 2: 2.2.10.6

Comment/Recommendation: *Proposed Solution:* ☐ New Text ☒ Revise Text ☐ Delete Text

The NBIC is supposed to be a safety Code so why is a "good practice" only a "good practice" if required by a jurisdiction. For example: 2.2.10.6a) Is or is not that paragraph a good practice? A jurisdiction only makes a "good practice" mandatory, but without the jurisdictional requirement a good practice is optional with the owner/user. This section should be revised to indicate "good practices" should be complied with but are mandatory when required by the jurisdiction.

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Comment No. Issued: 09

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(2)

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Section/Subsection Referenced: Part 2: 2.0.10.6h)

Comment/Recommendation: *Proposed Solution:* ☐ New Text ☒ Revise Text ☐ Delete Text

Revise: h) On forced circulation boilers the flow sensing device shall be tested to verify the boiler shuts down on loss of flow.

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard

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How is intended service of a tank determined when the service is not marked on the nameplate, and most likely is not listed on the Manufacturer's Data Report.

Further, what does welding have to do with a missing or illegible nameplate. Also, the paragraph states welding is prohibited, but the next sentence indicates post construction welding is permitted. The paragraph is confusing and contradictory. Please revise.

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Section/Subsection Referenced: Part 2:2.3.6.5(B)(4)

Comment/Recommendation: *Proposed Solution:* ☐ New Text ☒ Revise Text ☐ Delete Text

Z87 rated goggles: List the rating organization and the full identification of the specification.

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

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Section/Subsection Referenced: Part 2:2.3.6.7(a)(1)

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Change "must" and "should" to "shall".

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

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Section/Subsection Referenced: Part 2: 2.3.6.7(a)(3)

Comment/Recommendation: *Proposed Solution:* ☐ New Text ☒ Revise Text ☐ Delete Text

Change "should" to "shall". The vessel will not be in operation during an inspection so I don't understand how this requirement can be verified. This is an operational requirement and should not be in Part 2 of the NBIC.

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard _____

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Comment No. Issued: 15

Committee Referred To: SC Inspection

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Commenter Fax: 614-431-3208

Commenter Email: fbrown@nationalboard.org

Section/Subsection Referenced: Part 2: 2.3.6.7(b)(2) & (3)

Comment/Recommendation: *Proposed Solution:* ☒ New Text ☐ Revise Text ☐ Delete Text

Change "should" to "shall". In many cases, these are life saving vessels. The owner/operator should be told in strong terms the vessel needs to be in excellent condition. Should indicates "when you get around to it, minor inconvenience."

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard _____

Submit Form To: Robin Hough, Secretary, NBIC Committee, The National Board of Boiler & Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, fax 614-847-1828, email, rhough@nationalboard.org

NB Use Only

Commenter No. Issued: PR13-02

Comment No. Issued: 16

Committee Referred To: SC Inspection

9

National Board of Boiler and Pressure Vessel Inspectors

National Board Inspection Code

Submission of Public Review Comment
2013 Draft Edition

PLEASE SUBMIT ONLY ONE COMMENT/RECOMMENDATION PER PAGE
Make additional copies as needed

Comments Must be Received No Later Than: December 17, 2012

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

Date: 12/12/12

Commenter Name: Francis Brown

Commenter Address: 1055 Crupper Avenue

Columbus, OH 43229

Commenter Phone: 614-431-3226

Commenter Fax: 614-431-3208

Commenter Email: fbrown@nationalboard.org

Section/Subsection Referenced: Part 2: 2.3.6.7(b)(4)

Comment/Recommendation: *Proposed Solution:* ☐ New Text ☒ Revise Text ☐ Delete Text

Change "should" to "shall" Also, if the opening is for exhaust, then it is an outlet for the vessel. How is this inspection to be accomplished? Are there grates over the outlets?

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard

Submit Form To: Robin Hough, Secretary, NBIC Committee, The National Board of Boiler & Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, fax 614-847-1828, email, rhough@nationalboard.org

NB Use Only

Commenter No. Issued: PR13-02

Comment No. Issued: 17

Committee Referred To: SC Inspection

(10)

Attachment 3

PROPOSED INTERPRETATION

Inquiry No.	IN12-0201				
Source	Daren Daily & Mark Anderson				
Subject	Part 2, 5.5.2-5.2.3				
Edition	2011 Edition				
Question	If a National Board Commissioned Inspector has verified the replacement of stamped data or nameplate by an "R" Certificate Holder on Corrugated rolls that are not stationary and subject to operation in multiple Jurisdictions, possibly by multiple owners, is the application of an NB-136"Replacement of Stamped Data" form required?				
Reply	No, if performed by an "R" Certificate holder and verified by an National Board Commissioned Inspector the responsibility of traceability and nameplate accuracy is on the Certificate Holder similar to nameplate replacement in the NBIC Part 3, 5.5.9.5.				
Committee's Question					
Committee's Reply					
Rationale					
SC Vote	Unanimous	No. Affirmative	No. Negative	No. Abstain	No. Not Voting
NBIC Vote	Unanimous	No. Affirmative	No. Negative	No. Abstain	No. Not Voting
Negative Vote Comments					

PROPOSED INTERPRETATION

Inquiry No.	IN12-0202				
Source	Daren Daily & Mark Anderson				
Subject	Part 2, 5.5.2-5.2.3				
Edition	2011 Edition				
Question	Can an NB-136 "Replacement of Stamped Data Form" which is required to be signed by a National Board Commissioned Inspector, for Corrugated Rolls that are not stationary and subject to operation in multiple Jurisdictions, possibly by multiple owners, be filed with The National Board and copied to the applicable Jurisdiction in lieu of obtaining an approval signature from the Jurisdiction?				
Reply	Yes, the approval from one Jurisdiction should not be incumbent on any other Jurisdiction due to transient nature of Corrugated Roll Pressure Equipment. Similarly, if there was no Jurisdiction in the location of installation another Jurisdiction would be compelled to accept National Board filing if the equipment is moved.				
Committee's Question					
Committee's Reply					
Rationale					
SC Vote	Unanimous	No. Affirmative	No. Negative	No. Abstain	No. Not Voting
NBIC Vote	Unanimous	No. Affirmative	No. Negative	No. Abstain	No. Not Voting
Negative Vote Comments					

IN 12-0201

TECHNICAL INQUIRY -REVISIONS AND ADDITIONS & INTERPRETATIONS

Secretary, NBIC Committee
The National Board of Boiler and
Pressure Vessel Inspectors
1055 Crupper Avenue
Columbus, OH 43229

RE: NBIC PART 2, SECTION 5, 5.2 THROUGH 5.2.3

REPLACEMENT OF STAMPING DURING INSERVICE INSPECTION

& NB-136 REPLACEMENT OF STAMPED DATA FORM

++

Statement of Need:

The verbiage of the NB-136 "REPLACEMENT OF STAMPED DATA FORM" appears to have originally been written around stationary equipment that has its In-Service Inspections performed at the Owners or Users site by an Inspector. Because it does not appear to address transient equipment that is serviced off-site, and moved between Jurisdictions, it has caused confusion with regards to who should file this form (owner/user or Certificate Holder) and if this form is applicable to all Pressure Equipment or just stationary equipment.

++

Background Information:

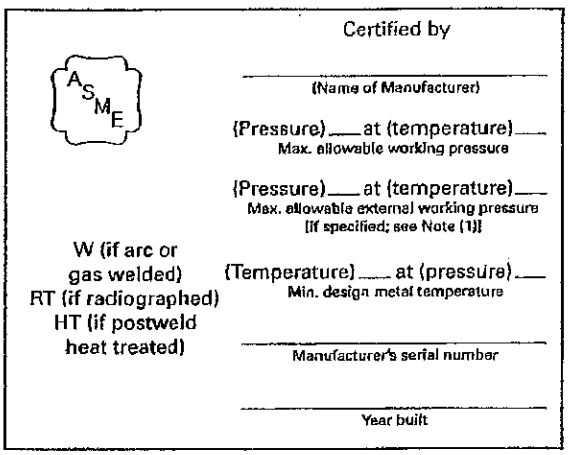
- Corrugated Rolls are not stationary and are routinely transported to an "R" Certificate holder's facility for refurbishment, frequently requiring the replacement of lost or illegible nameplates.
- Corrugated Roll owners rely on a Certificate Holder to perform nameplate maintenance and the filing of any applicable documentation.
- Multi-Plant owners routinely exchange Corrugated Rolls from one Jurisdiction to another, including to and from areas that have no Jurisdiction.

Background Information (continued):

- Being the trusted eyes, ears, and hands of any Jurisdiction, a National Board Commissioned Inspector's signature could be sufficient evidence of compliance to I.D. traceability and verification of a Pressure Vessel in lieu of requiring authorization, as is the case in new construction and where no Jurisdiction exists.
- NBIC Part 3, Section 5, 5.9.5 [(a) & (b)] allows for the re-stamping or nameplate replacement on Safety Valves without the requirement for the creation or filing of an NB-136 "Replacement of Stamped Data Form", instead putting the responsibility on the Certificate Holder.
- In processing the NB-136 form, some Jurisdictions prefer the National Board Commissioned Inspector to verify everything before it is sent to them, which requires the replacement nameplate to already be attached, others prefer to follow the format of the form and sign for authorization first.
- Pressure Equipment that did not have its data report filed with The National Board, (EG: U-3 for UM stamped equipment), and no longer has a data report available (> 5 years), can only have its traceability verified matching historical stampings to historical documentation as available. Such historical stampings may be located on various surfaces of the Pressure Equipment and as such can only be assured by on on-site inspector prior to commencement of preparing a replacement nameplate.
- Verbiage is suggested to provide uniformity to the ASME Code [UG-119 (d) & (f)], see attached.

(10) (a)

FIG. UG-118 FORM OF STAMPING



GENERAL NOTE: Information within parentheses is not part of the required marking. Phrases identifying data may be abbreviated; minimum abbreviations shall be MAWP, MAEWP, MDMT, S/N, and year, respectively.

NOTE:
(1) The maximum allowable external working pressure is required only when specified as a design condition.

(1) The required markings on a nameplate shall be in characters not less than $\frac{5}{32}$ in. (4 mm) high, except that characters for pressure relief device markings may be smaller.

(2) Characters shall be either indented or raised at least 0.004 in. (0.10 mm) and shall be legible and readable.

(d) The nameplate may be marked before it is affixed to the vessel, in which case the Manufacturer shall ensure that the nameplate with the correct marking has been applied to the proper vessel, and the Inspector shall satisfy himself that this has been done.

(e) The nameplate shall be attached to the vessel or to a pad, bracket, or structure that is welded, brazed, soldered, or attached with mechanical fasteners directly to the vessel. Mechanical fasteners shall be of a material and design that is compatible with the vessel, bracket materials, and the vessel service. After installation of the pad, bracket, or structure, the heads of the fasteners shall be welded, brazed, or soldered to the pad, bracket, or structure that supports the nameplate. The nameplate shall be located within 30 in. (760 mm) of the vessel. Removal shall require the willful destruction of the nameplate, or its attachment system. (See M-3.)

(1) Nameplates may be attached either by welding, brazing, or soldering.

(2) Nameplates may be attached by tamper-resistant mechanical fasteners of suitable metal construction.

(3) Nameplates may be attached with pressure-sensitive acrylic adhesive systems provided that, in addition to the requirements of this paragraph, those of Appendix 18 are met.

(f) An additional nameplate in accordance with (a) through (d) may be installed on the skirt, supports, jacket, or other permanent attachment to a vessel. All data on the additional plate, including the Certification Mark with the Designator, shall be as required for the mandatory nameplate. The marking need not be witnessed by the Inspector. The additional nameplate shall be marked: "DUPLICATE."

(g) When a nameplate is employed, the Manufacturer's name or identifying trademark, and vessel serial number (or National Board Number, if applicable,) may also be marked directly on the vessel in close proximity to the nameplate attachment. The marking shall be of a visible permanent type that is not detrimental to the vessel, and its location shall be indicated on the Data Report.

(1) If the thickness limitations of UG-118 preclude marking directly on the vessel shell or heads, it may be applied to the skirt, supports, jacket, or other permanent attachment to the vessel.

UG-120 DATA REPORTS (10) (a)

(a) A Data Report shall be filled out on Form U-1 or Form U-1A by the Manufacturer and shall be signed by the Manufacturer and the Inspector for each pressure vessel marked with the Certification Mark with the U Designator.

(1) Same day production of vessels may be reported on a single Form provided all of the following requirements are met:

(a) vessels must be identical;

(b) vessels must be manufactured for stock or for the same user or his designated agent;

(c) serial numbers must be in uninterrupted sequence; and

(d) the Manufacturer's written Quality Control System includes procedures to control the development, distribution, and retention of the Data Reports.

(2) The number of lines on the Data Report used to describe multiple components (e.g., nozzles, shell courses) may be increased or decreased as necessary to provide space to describe each component. If addition of lines used to describe multiple components results in the Data Report exceeding one page, space must be provided for the Manufacturer and Authorized Inspector to initial and date each of the additional pages. Horizontal spacing for information on each line may be altered as necessary. All information must be addressed; however, footnotes described in the remarks block are acceptable, e.g., for multiple cases of "none" or "not applicable."

(3) The Manufacturer shall:

(a) furnish a copy of the Manufacturer's Data Report to the user and, upon request, to the Inspector;

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Inspection

c) The existing repair nameplates, if applicable, shall not be removed during such testing.

5.9.5 REPLACEMENT OF ILLEGIBLE OR MISSING NAMEPLATES

a) Illegible Nameplates
When the information on the original manufacturer's or assembler's nameplate or stamping is illegible, but traceability can be confirmed, the nameplate or stamping will be augmented by a nameplate furnished by the "VR" stamp holder stamped "Duplicate." It shall contain all information that originally appeared on the nameplate or valve, as required by the applicable section of the ASME Code, except the "V," "HV," or "UV" symbol and the National Board mark. The repair organization's nameplate, with the "VR" stamp and other required data specified in 5.9.2, will make the repairer responsible to the owner and the jurisdiction that the information on the duplicate nameplate is correct.

b) Missing Nameplates
When the original valve nameplate is missing, the repair organization is not authorized to perform repairs to the valve under the "VR" program, unless positive identification can be made to that specific valve and verification that the valve was originally stamped with an ASME "V" or "UV" symbol or marked with an ASME "HV" symbol. Valves that can be positively identified will be equipped with a duplicate nameplate, as described in this section, in addition to the repairer's "VR"-stamped nameplate. The repairer's responsibilities for accurate data, as defined in 5.9.5(a) (Illegible Nameplates), shall apply.

c) Marking of Original Code Stamp
When a duplicate nameplate is affixed to a valve, as required by this section, it shall be marked "Sec. I," "Sec. IV," or "Sec. VIII," as applicable, to indicate the original ASME Code stamping.

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 "ANTISEIZE," 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).

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Requested Interpretations:

Q:, If a National Board Commissioned Inspector has verified the replacement of stamped data or nameplate by an "R" Certificate holder on Corrugated Rolls that are not stationary and subject to operation in multiple Jurisdictions, possibly by multiple owners, is the application of an NB-136 "Replacement of Stamped Data Form" required?

PROPOSED REPLY: No, if performed by an "R" Certificate holder and verified by a National Board Commissioned Inspector the responsibility of traceability and nameplate accuracy is on the Certificate Holder similar to nameplate replacement in the NBIC, Part 3, SECTION 5, 5.9.5.

++

Q: Can an NB-136 "Replacement of Stamped Data Form", which is required to be signed by a National Board Commissioned Inspector, for Corrugated Rolls that are not stationary and subject to operation in multiple Jurisdictions, possibly by multiple owners, be filed with The National Board and copied to the applicable Jurisdiction in lieu of obtaining an approval signature from the Jurisdiction?

PROPOSED REPLY: Yes, the approval from one Jurisdiction should not be incumbent on any other Jurisdiction due to the transient nature of Corrugated Roll Pressure Equipment. Similarly, if there was no Jurisdiction in the location of installation another Jurisdiction would be compelled to accept National Board filing if the equipment is moved.

++

Respectfully submitted:
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Inspection

Supplement 9

Requirements for Change of Service

S9.1 Scope:

This Supplement provides requirements and guidelines to be followed when a change of service or service type is made to a pressure retaining item.

Whenever there is a change of service, the local jurisdiction where the pressure retaining item is to be operated shall be notified for acceptance, when applicable. Any specific jurisdictional requirements shall be met.

S9.2 Classification of Service Changes

S9.2.1 Service Contents

A change in service contents is considered to be any modification to the commodity or contents that the pressure retaining item was originally intended to contain when the pressure retaining item was constructed.

For example, a change:

a) From LP gas service to ammonia service.
b) From lethal to non lethal service or vice versa

S9.2.2 Service Type or Change of Usage

A change in service type is considered to be a change of how the pressure retaining item is being used.

For example, a change:

a) From above ground service to underground service for LP gas tanks.
b) From mobile or transport use to stationary use

S9.3 Factors to Consider

Before a change of service is to be made, the owner or user shall consider and evaluate the effects of the new operating conditions or environment on the existing condition and suitability for service of the

pressure retaining item. Various factors will have an impact on the reliability of the pressure retaining item in its new service environment. Changes can be successfully adopted providing there is an understanding of the effect on the pressure retaining item. However, there are some cases where changes are detrimental to the existing pressure retaining item. The owner or user should seek technical guidance of experienced personnel in appropriate areas affected by the change of service (e.g. design, metallurgy, or operations of the pressure retaining item).

The following is a listing of criteria that should be evaluated as appropriate. The criterion is not limited to that listed herein. Other factors may be considered as necessary;

1) Design Consideration:
   a) Thickness of existing vessel material
   b) Vessel or system flow rate or pressure
   c) Weight of vessel with new contents
   d) Existing or additional loads imposed on nozzles and highly stressed areas
   e) Change in pressure or temperature cycling
   f) Compliance to product or industry standards, such as ANSI K61, API 579, or NFPA 58

2) Material Consideration:
   a) Chemical and mechanical properties of existing material or any new material to be added or replaced to assure it has the required strength and toughness to withstand the pressure and temperature effects of the new environment.
   b) Effects of erosion or corrosion
   c) Time dependent effects on service life - creep or fatigue.

3) Environment
   a) Physical condition of the pressure retaining item
   b) Overpressure protection needs
   c) Regulatory environment - Verification of compliance to new or existing jurisdictional rules or regulations.

4) Operational History
   a) A review of current and past operational logs or records should be made to assure that no conditions existed where any further use would render the pressure retaining item hazardous or otherwise unsafe.
   b) Records to be obtained and reviewed would include Data Reports, Repair and Alteration Forms, Inspection reports.

5) Repairs and Alterations Made:

a) A review of any repairs, alterations, reratings, or reconfigurations that have been performed on the pressure retaining item , so as to assure that they will not have a detrimental impact on the intended use.

6) Proposed rework
   a) Any physical work to be performed to restore the material to the existing or intended state or to meet any requirements for the new operating conditions.
   b) Repairs and alterations shall be performed in accordance with NBIC, Part 3.
   c) The effects of heat applied as a result of welding or heat treatment on the material or shaped parts.
   d) The method and extent of any physical or non destructive examination should be considered.
   e) Any physical testing or pressure testing to be performed to determine of verify leak tightness or structural integrity of the pressure retaining item.
   f) The pressure retaining item shall meet the Code requirements for the new environment at the time of change.

7) Documentation
   a) Review existing records that are required to satisfy customer, user, or legal requirements.
   b) Review the need for any marking, stamping, or labeling required for the intended service.

S9.4 Some Examples for Change of Service

The following is a typical list of examples of what constitutes a change in service and some factors to consider. Note: This list is not all inclusive. There may other service changes not mentioned.

Also, the listing of "Factors to Consider" is also not all inclusive. There may be other there are other elements that can influence the safe and reliable operation.

The Owner, the Jurisdiction where the pressure retaining item is to operate in the new environment, and local building Codes, laws, and regulations should be reviewed for additional requirements or prohibitions against a change of service.

Change	Some Factors to Consider
LP gas to ammonia	• PWHT of vessel during construction • Wet-fluorescent magnetic particle testing (WFMT) on all internal surfaces • Internal access of vessel is necessary. May need to install manhole.

Change	Some Factors to Consider
Ammonia to LP gas	• NFPA-58 should be consulted. i.e. restriction on maximum volume • Wet-fluorescent magnetic particle testing (WFMT) on all internal surfaces • Internal access of vessel is necessary. May need to install manhole. • Also see, NBIC Part 2, 2.3.6.4
LP gas service: from above ground to underground	• Requires alterations (additional nozzles). • Corrosion protection • See NFPA 58
LP gas to air receiver	• Assurance of vessel cleanliness. i.e. removal of mercaptan. • Appropriateness and number of inspection and drain openings. • Corrosion allowance
Boiler service: Steam to Hot Water	• May require replacement of smaller steam outlet nozzle with larger nozzle to accommodate condensate carryover
Sulfur dioxide service. Sweet to sour gas service.	• Concern over hydrogen cracking
Lethal service to non-lethal	• Design conditions and suitability for service
DOT railcars or ICC transport tanks to stationary service	• Prohibited by DOT regulations (49 CFR 180) for permanent service. • Temporary stationary service permitted as per NFPA 58 • Inspection for damage mechanisms that may be present from previous service life that is detrimental to the vessel in the new environment.

S9.5 Documentation of Change of Service

Any records, forms, or reports required documenting the change of service event that may be required by contract or the jurisdiction where the pressure retaining item operates shall be completed as specified.

NBIC Part 2

Add new paragraph:

1.6 Change of Service

Supplement 9 provides requirements and guidelines to be followed when a change of service or service type is made to a pressure retaining item.

Whenever there is a change of service, the local jurisdiction where the pressure retaining item is to be operated, shall be notified for acceptance, when applicable. Any specific jurisdictional requirements shall be met.

NBIC Part 1

Add new paragraph:

1.5 Change of Service

See NBIC Part 2, Supplement 9 for requirements and guidelines to be followed when a change of service or service type is made to a pressure retaining item.

Whenever there is a change of service, the local jurisdiction where the pressure retaining item is to be operated, shall be notified for acceptance, when applicable. Any specific jurisdictional requirements shall be met.

NBIC Part 3

Add new paragraph:

1.9 Change of Service

See NBIC Part 2, Supplement 9 for requirements and guidelines to be followed when a change of service or service type is made to a pressure retaining item.

Whenever there is a change of service, the local jurisdiction where the pressure retaining item is to be operated, shall be notified for acceptance, when applicable. Any specific jurisdictional requirements shall be met.

NB08-0701

S7.9 REQUIREMENTS FOR CHANGE OF SERVICE FROM ABOVEGROUND TO UNDERGROUND SERVICE

ASME LPG storage vessels may be altered from aboveground (AG) service to underground (UG) service subject to the following conditions.

1. Vessels that have been previously used in anhydrous ammonia service are not permitted to be converted to LPG service.

2. The outside surface of the vessel shall be cleaned to bare metal for an external inspection of the vessel under the guidelines of this Supplement. Prior to placing underground, the outside surface of the vessel shall be prepared consistent with the paint manufactures specification and coated with a coating suitable for UG service. Any touch-up coating shall the same coating material. All corrosion shall be repaired in accordance with the NBIC.

3. Verify that here is no internal corrosion due to valves having been removed while the container was out of service.

4. Any unused connections located on the vessel shall be closed by seal welding around a forged plug or moved using a flush patch. If a flush patch is used the material shall be the same material thickness and material grade as the original code of construction.

5. All connections on top of the vessel, except for the liquid withdrawal opening, shall be replaced with a riser pipe with multi-valve suitable for UG LPG service. The valve shall be enclosed in a protective housing and placed underground in accordance with jurisdictional requirements.

6. The liquid withdrawal opening shall be located within the protective housing.

7. The liquid level tube in the multivalve shall be the length required according to jurisdictional requirements.

8. The NBIC nameplate shall be made of stainless steel and continuous welded to the vessel wall. The nameplate shall also have the information from the original nameplate. This shall include the manufactures name, container serial number, National Board number, if registered with the NBIC, MAWP, year-built, head and shell thickness be stamped for "UG service", the "liquid level tube length= ____ inches" and the National Board "R" stamp. The original manufactures nameplate shall remain attached to the vessel. See Part 2-5.2, Part 3-5.7 for additional stamping requirements.

9. The support legs and lifting lugs may remain in place and shall be welded around the entire periphery to prevent crevices that create a potential area for corrosion. Unused attachments shall be removed and welds ground flush.

10. A connection shall be added for the attachment of an anode for cathodic protection.

11. All welding shall be performed by a qualified "R" stamp holder using a qualified welding procedure.

(7)
1/9

COMMITTEE CORRESPONDENCE

COMMITTEE: NBIC

TO: NBIC

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

FROM: Robin Hough
NBIC Secretary

SUBJECT: Letter Ballot NB08-0701 MC

DATE: September 27, 2012

Committee Members:

Letter ballot NB08-0701 MC has now closed. The ballot has failed. Per the NBIC procedure 7.1 all NBIC revisions need a 2/3 majority to be approved. This item will now appear on the agenda for the next meeting for more discussion.

11	Approved
9	Disapproved
1	Abstained
0	Not Voting
3	Not Returned

:rmh

Ballot Votes NB08-0701 MC

Name	Email	Votes	Vote Date
[redacted]	[redacted]	Abstention	08/24/12
Benjamin Anthony	banthony@dlt.state.ri.us	Approve	09/05/12
Bob Reetz	breetz@nd.gov	Approve	08/30/12
Frank Hart	fhart@furmanite.com	Approve	08/27/12
James Pillow	jpillow@commonarc.com	Approve	08/27/12
Jim Riley	jim.riley@conocophillips.com	Approve	09/13/12
Jim Sekely	jsekely@comcast.net	Approve	08/25/12
Lawrence McManamon	lmac@glabap.com	Approve	08/27/12
Michael Richards	hmrichar@southernco.com	Approve	08/28/12
Paul Bourgeois	pcbourge@travelers.com	Approve	08/28/12
Ralph Pate	ralph.pate@labor.alabama.gov	Approve	09/06/12
Ronald Pulliam	rlpulliam@babcock.com	Approve	09/04/12
Bryan Schulte	bryan.schulte@nrgenergy.com	Disapprove	08/31/12
Craig Hopkins	chopkins@seattleboiler.com	Disapprove	09/04/12
Domenic Canonico	canonicod@epbfi.com	Disapprove	08/24/12
George Galanes PE	ggalanes@diamondtechnicalservices.com	Disapprove	08/24/12
John Richardson	jwrichar@aol.com	Disapprove	09/09/12
Mark Mooney	mark.mooney@libertymutual.com	Disapprove	09/27/12
Michael Webb	mike.webb@xcelenergy.com	Disapprove	09/07/12
Paul Edwards	paul.edwards@shawgrp.com	Disapprove	09/06/12
Raymond Snyder	raymond.snyder@ariseinc.com	Disapprove	08/29/12
Don Cook	dcook@hq.dir.ca.gov	Not Voted	N/A
Gary Scribner	Gary.Scribner@dfs.dps.mo.gov	Not Voted	N/A
Stanley Staniszewski	stanley.staniszewski@dot.gov	Not Voted	N/A

Ballot Comments NB08-0701

Name	Document	Comment	Date Created
Mark Mooney		Michael Webb has some very good points that should be addressed.	09/27/2012
Robert Wielgoszinski		So many negatives. I will wait for the revised proposal.	09/24/2012
John Richardson		I believe there are too many open questions, as evidenced in the comments, for this item to move forward.	09/09/2012
Michael Webb	Comments NB08-0701, 9-7-12.pdf	I have too many unresolved questions and vote, "disapprove". I offer the attached comments either for clarification or as suggestions for adoption.	09/07/2012
Robin Hough	NBIC 08-0701 9-6-12.pdf	Gentlemen: Attached is a revised version of the document for you to review.	09/06/2012
Paul Edwards		This is a worthy effort, however I believe the comments need to be addressed prior to publication.	09/06/2012
Craig Hopkins		Many compelling comments below.	09/04/2012
Ronald Pulliam		Also agree with Mr. Pillow's comments, particularly about defining the blast media and the extent. Some media could actually peen defects over and leave them undetected.	09/04/2012
Bryan Schulte		I vote to disapprove the NB08-0701 letter ballot, for the following reasons: Item 1: suggest either eliminating the 2nd sentence or adding additional methods for determining if the tank was previously used for anhydrous ammonia service. Item 3: is corrosion due to removed valves the only corrosion of concern? Item4: define "original material" or use another term. Item 5: Better definition / specification of standpipe and domed sleeve requirements. 2nd sentence requires "to grade", 3rd sentence requires "top of grade". Item 12: define / refer to application process and define "original coating".	08/31/2012
Greg McRae		The following are Proposed changes to NB08-0701,S7.0: same line numbers as document. Proposed: 2) Using the proper blasting media the container shall be blasted to bare metal so an inspection can be performed under the guidelines of this supplements. Comment: 3) if will be very difficult to make internal inspection of the propane tanks. the girth seams are off set joints. UW 13.1. The internal surface of the tank will likely be covered a petroleum based material that accumulates over years of service. Proposed: 4) Any unused connection shall be plugged using a forged steel plug and welded in place. Proposed: 8) The support	08/29/2012

	legs, lifting lugs or other attachments may remain in place. All attachments shall be welded around their entire periphery to avoid corrosion. Proposed: 12)Any coating and touch up coating used at the time of installation shall be suitable for underground corrosion protection.	
Raymond Snyder	I agree with Domenic comments	08/29/2012
Michael Richards	Can vote 'Approved' with slight wording change in Item 9 'All attachment fillet welds shall be visually inspected prior to vessel coating as noted in Item 12.'	08/28/2012
Michael Richards	Can vote 'Approved' with slight wording change in Item 9 'All attachment fillet welds shall be visually inspected prior to vessel coating as noted in Item 12.'	08/28/2012
James Pillow	JPillow 8/27/12 I approve but have questions and comments for consideration, perhaps on a future item. Item 1-Is anhydrous ammonia the only substance that turns brass blue? Item 2-Use of only the word "blasted" leads one to ask "with sand, water, other type grit"? Perhaps say "cleaned with abrasive to bare metal" or something similar. Also, is the vessel to be cleaned only on the inside, outside, or both? Item 8-Is removing the attachment allowed? If allowed, is attachment to be ground flush? Think about clarifying - "if attachment remains or is not ground flush, it shell be welded 360 degrees around the attachment to prevent . . ", etc. Item 11 Is the head thickness to be the existing or the thickness on the original MDR? Item-This is nit picky, but can a word, or phrase other than "burial" be used?	08/27/2012
Michael Webb	I have several comments and abstain only to allow the project manager to respond: Item 3- Question / Comment: Verify "NO" internal corrosion...while the container was out of service? While I am not very familiar with these vessels, they appear to have very limited access to assert a verification process as indicated; possibly visually using varying direct and indirect methods through not used connections. Does this infer no internal corrosion what so ever, or does this mean beyond the manufacturer's indicated corrosion allowance, or is it identifying no internal corrosion is allowed? If there is a presence of internal corrosion and the identified valves are in place, is the presumption then that the vessel has not degraded further so it is acceptable? I believe the implication is a condition assessment or that a suitability for extended service evaluation is completed prior to other repair activities taking place. However, I can not be sure.... Last comment here, does this compliment or compete with the current information presented in Part 2, Section 6, S7.8.5 CORROSION? Item 4- Proposed revision to read: Any unused connection loeated on the storage container shall be	08/24/2012

	eliminated from future service by welding, using a material meeting the requirements of the container's original code of construction and the requirements for REPAIRS as described in the NBIC Part 3, Section 3. When a connection is removed, a flush patch meeting the requirements of 3.3.4.6 shall be met. Item 5- Question: Is there a standard or workmanship requirement for the attachment of the indicated, "multivalve" to the standpipe? Is this multivalve typically a threaded connection, welded connection, or either? I am not familiar with this and I believe I can envision what is described but this is not clear. Would the guidance offered herein be more clear with the inclusion of a simple sketch indicating the standpipe, withdrawal connection, profile of grade, typical industry-type anode attachment methods, and extended nameplate standoff if applicable? Item 8- Question- The second sentence: All attachment welds shall "encircle" the attachment to prevent crevices… Is this to say that all attachment welds shall be fully welded, leaving no areas open to further corrosion? Without some required cathodic protection (see item 9), is the concern for corrosion below ground moot? Item 9- Comment: If there is a requirement to provide connections (which are what?) for the sacrificial anodes representing cathodic protection, should there not be a requirement to use them? Is cathodic protection a requirement for underground service? As an inspection activity, should the presence of a sacrificial anode / cathodic protection be an initial inspection item? Item 10- Comment: If the proposed language of item 4, or something similar representing Part 3 requirements is adopted, this item identifying any welded repairs be completed by an "R"-Certificate Holder may not be needed. Item 11- Comment- As a changed service to underground, does the stamping requirements need to be profiled to allow some method of extended attachment to a location above ground? I am unfamiliar how nameplates for underground vessels / containers may be attached to verify something below ground; possibly attached to the required standpipe's domed sleeve. Proposed item 13 (item 12 if current item 10 is removed) - I would concede that this may not be needed but is offered for comment; un-necessary or otherwise: Examination methods shall be directly applied. No indirect acceptance examination is allowed. Inspection activities of the work and verification of stamping shall be prior to the container being buried underground.	
George Galanes PE	I am voting disapprove on this ballot because I believe items 2,4, and 10 should be re-worded. I am providing the suggested changes below for your consideration; Proposed Revisions: 2. The container shall be grit blast cleaned in	08/24/2012

preparation for inspection under the guidelines of this Supplement. 4. Unused connections located on the container shall be sealed by welding a forged plug or completely removed by installation of a flush patch plate. The flush patch plate shall be of the same thickness and type as the original container shell material. 10. Welding shall be performed by an organization in possession of a current National Board R-Certificate of Authorization.

Domenic Canonico

There are too many questionable conditions that may not be easily resolved. I do not support placing a piece of equipment into service which can contaminate the area surrounding it's burial site. If this item should pass the end of 2nd sentence ---"original material" should be clarified. What is "the original material? Is it the same material specification?

(13)

7/9

Comments: NB08-0701

I clearly recognize the efforts made to introduce inspection activities where there may have been none. I have too many unresolved questions and vote, "disapprove". I offer the attached comments either for clarification or as suggestions for adoption.
-Mike Webb 9-7-12

S7.9 REQUIREMENTS FOR CHANGE OF SERVICE FROM ABOVE GROUND TO UNDERGROUND SERVICE

Comment / Question:
Regarding the revised effort dated R-Sept. 6, 2012 following the supplement title, "S7.9 REQUIREMENTS FOR CHANGE OF SERVICE...", the following introduction was stated:

"ASME LPG storage vessels may be *altered* (changed) from above ground (AG) service to underground (UG) service subject to the following conditions:"

Does the reference to the change of service from above ground to underground suggest that the definition for alteration needs to be revised?

In my opinion the paragraph introduction should be revised to the more general statement shown above with the word "changed" re-introduced as shown above within the parenthetical.

Item 2-
Question:
This item refers to using a proper blasting media to prepare the container for an inspection under the guidelines of this supplement. Is this language specifically aligning the inspection activities to S7.1 b) as an underground vessel?
For purpose of Supplement continuity, may I propose the paragraph S7.1 b) be revised to read:

b) The application of this Supplement to vessels used in underground storage will be necessary when evidence of leakage or structural damage to the vessel has been observed or reported, when the vessel has been dug up and is to be returned to its underground location, or prior to the vessel's service being changed from above-ground to underground service".

Rational: Without the specific mention of the "change of service", the initial inspection activities *preparing* a vessel for underground storage may be interpreted as not needed as the vessel has not yet been dug up as currently stated at Part 2, S7.1 b).

Item 3-
Question:

a) As stated in other comments, the efforts to "verify" the absence of corrosion when the access to the internal surface is very limited and may not be dutifully possible? As indicated, girth seams are offset and may hide something that can not be recognized...practically, thereby inadvertently compromising a "verification of *no* corrosion". For that matter, there is the potential that some minor pitting may have been in place from original storage or fabrication that is out of view still compromising the assertion of "verification".

   Should the language at item 3 be relaxed to allow for safeguards to be practicably introduced such as:

   "When vessel connections have evidence of leakage or corrosion, or unused connections have been opened, the internal condition of the vessel shall be examined by any means suitable in providing meaningful results to afford assurance an unsafe condition does not exist."?

b) Does the method of verification need to be accepted, and if so by whom?
c) Is this verification demonstrated in a report and shown to the owner, user, or an Inspector representing the jurisdictional authority as suggested at @ Part 2, S7.1 a) or S7.2 a-4)?
d) Is the verification reported on a Form NB-7 shown in Part 2, 5.3.6? If not, is there a required report representing the change of service and the interests of the jurisdictional authority, if required?

Item 4-
Question:
Depending on the configuration of the unused connections identified in the first sentence, the welding may be outside of the Code –boundary of the vessel. The question of weld quality comes into play as does the qualification of the repair organization.

a) If the unused connection is a threaded connection originally welded to the vessel by the Manufacturer, is the intent of the guidance of the first sentence to merely seal weld a threaded plug or to render by welding the connection is seal welded shut?
b) Is the weld quality in plugging the unused connections to coincide with the requirements of the vessel's original code of construction?

(4)

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c) There is no reference as to what qualifications are needed by the repair organization seal welding the plugs into the noted connections until item 11 is introduced. For purposes of continuity, should the information introduced at item 11 ("All welding shall be performed by an organization possessing a current "R"-Certificate of Authorization...") be introduced prior to item 4 or within the content of item 4?

The guidance of item 4 further offers as an alternative to enlist the flush patch as a method to completely remove unused connections from further service. The ensuing guidance then offers no further requirements other than the flush patch material shall be the same thickness of the vessel being weld repaired. Simply, I would propose that the language in item 4 be revised to read:

"Any unused connection located on the storage vessel shall be eliminated from future service by seal welding a plug into the connection, using a material meeting the requirements of the vessel's original code of construction and the requirements for REPAIRS as described in the NBIC Part 3, Section 3. When a connection is removed from the vessel, a flush patch meeting the requirements of 3.3.4.6 shall be met".

Rationale: The requirements of thickness, joint efficiency, weld quality, NDE, the WPS, welder qualification, and acceptance testing or examination are all intrinsic.

Item 5:
Comment:
Admittedly, I am not familiar with LPG-vessels. With that admission, the language regarding connections between the current proposed language of item 4 and item 5 seem confusing. Are the connections indicated in item 5, fill / charge-connections? In my opinion the connections indicated by either item; or specifically item 5, should be more distinct for those unknowledgeable such as me.

Item 8-
Comment / Question:
The N-BD nameplate indicated suggests (I think) an "R"-Certificate Holder's nameplate; using a continuous weld, be welded to the vessel.

Question: Regarding the above, is this seal welding of the nameplate a result of a presumed welded repair activity previously identified at item 4 or is this a requirement because of the "change of service"?

Within the proposed item 8, the additional stamping requirements indicated by the reference to Part 3, 5.7 asks the "R"-Certificate Holder to place the repair nameplate adjacent to the original Manufacturer's stamping or nameplate. Additionally as I interpret this item 8, all of the original manufacturer's information (9-items) *shall* be included on the repair nameplate, in addition to the requirements shown in Part 3, Figure 5.7.5-a.
All of this is required FOR A VESSEL THAT WILL BE LOCATED OR RE-LOCATED UNDERGROUND with no apparent above ground reference? IS THIS THE EXPECTATION?

Other Questions:
a) Does the "Change of Service" above ground (AG) to underground (UG) warrant a nameplate as possibly suggested *without* the reference to a welded repair?
b) If "a"-above is no, should the language of item 8 be revised to begin as, "When welding is required, the "R" Certificate Holder completing the welding activity shall attach the repair nameplate..." ?
c) When a Change of Service from Above Ground to Underground is contemplated, should there be a provision that would allow either:
    1) The original nameplate attached to the LPG-vessel being relocated underground, be removed and attached to a disclosed location above ground and witnessed by the jurisdictional authority; if required, per Part 2, 5.2.
    2) A facsimile of the original Manufacturer's tag be relocated and attached to a disclosed location above ground and witnessed, if required, per Part 2, 5.2.
d) The original Manufacturer's nameplate may not be stainless steel. How is this tag protected underground?
e) If the requirements for locating the repair tag adjacent to the original Manufacturer's nameplate as referenced in Part 3, 5.7.2 c) are upheld; and both are buried, should a secondary repair tag located and attached at a disclosed location above ground be considered?
f) When welding is required for an underground vessel, should the use and location of a secondary tag (if allowed) and for that matter, "the change of service" be fully described on the required Form R-1 meeting the instructions of Part 3, 5.2.1?

Item 10:
Comment- If a provision for cathodic protection *shall* be added, should the attachment be by welding?
Rationale: A mechanical connection may compromise the effort for protection; if used. Anywhere a mechanical connection can be eliminated would make the cathodic protection more reliable.

(15)

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SUPPLEMENT 9

INSPECTION OF STATIONARY HIGH PRESSURE (3000-15000 psi) COMPOSITE PRESSURE VESSELS

S9.1 SCOPE

This supplement provides specific guidelines for inspection of high pressure composite pressure vessels, hereafter referred to as vessels. This supplement is applicable to pressure vessels with a design pressure that exceeds 3000 psi but no greater than 15000 psi, and is applicable to the following four classes of pressure vessels:

a) Metallic vessel with a hoop Fiber Reinforced Plastic (FRP) wrap over the straight shell cylindrical part of the vessel (both load sharing).b) Fully wrapped FRP vessel with a non-load sharing metallic liner.

c) FRP vessel with a non-load sharing non-metallic liner.

d) Fully wrapped FRP vessel with load sharing metallic liner.

S9.2 INSERVICE INSPECTION

a) Section 1 of this Part shall apply to inspection of high pressure vessels, except as modified herein. This supplement covers vessels, and was not written to cover piping and ductwork, although some of the information in this supplement may be used for the inspection of piping and ductwork.

b) The inspection and testing for exposed load sharing metallic portions of vessels shall be in accordance with Part 2, Section 2.3 and 4 of this Code.

c. All composite vessels shall have an initial acoustic emission examination per S9.11 after the first 3 years from the date of manufacture. Thereafter, vessels shall have a maximum examination interval of 5 years which shall be shortened based on the results of any external inspection per paragraph S9.7.

(10)

d. All vessels shall be subject to the periodic inspection ~~frequency given in S9.9.~~

S9.3 GENERAL

a) High pressure composite vessels are used for the storage of fluids at pressures up to 15000 psi. Composite vessels consist of the FRP laminate with load sharing or non-load sharing metallic shells/liners, or non metallic liners. The FRP laminate with load sharing metallic liners form the pressure retaining system. The FRP laminate is the pressure retaining material for composite vessels with non-load sharing metallic and non metallic liners. The purpose of the non-load sharing metallic and the non metallic liners is to minimize the permeation of fluids through the vessel wall.

b) Fluids stored in vessels are considered to be non corrosive to the materials used for vessel construction. The laminate is susceptible to damage from:

1) External Chemical attack
2) External Mechanical damage(i.e. abrasion, impact, cuts, dents, etc.)
3) Structural damage (i.e. over pressurization, distortion, bulging, etc.)
4) Environmental degradation [i.e. ultraviolet (if there is no pigmented coating or protective layer), ice, etc.]
5) Fire or excessive heat

S9.4 VISUAL EXAMINATION

a) Acceptable Damage

Acceptable damage or degradation is minor, normally found in service, and considered to be cosmetic. This level of damage or degradation does not reduce the structural integrity of the vessel. This level of damage

or degradation should not have any adverse effect on the continued safe use of the vessel. This level of damage or degradation does not require any repair to be performed at the time of in-service inspection. When there is an external, non load bearing, sacrificial layer of filaments on the vessel, any damage or degradation should be limited to this layer. Damage or degradation of the structural wall shall not exceed the limits specified in Table 1.

b) Rejectable Damage (Condemned—Not Repairable)

Rejectable damage or degradation is so severe that structural integrity of the vessel is sufficiently reduced so that the vessel is considered unfit for continued service and must be condemned and removed from service. No repair is authorized for vessels with rejectable damage or degradation.

c) Acceptance Criteria

Certain, specific types of damage can be identified by the external in-service visual inspection. Indications of certain types and sizes may not significantly reduce the structural integrity of the vessel and may be acceptable so the vessel can be left in service. Other types and larger sizes of damages may reduce the structural integrity of the vessel and the vessel must be condemned and removed from service. Table 1 is a summary of the acceptance/rejection criteria for the indications that are found by external visual inspection of the vessel.

d) Fitness-for-service

1) If a visual inspection reveals that a vessel does not meet all criteria of Table 1 satisfactorily, it shall be taken out of service immediately, and either be condemned or a fitness-for-service examination be conducted by the original vessel

manufacturer who must also hold a National Board R certificate. When the vessel is taken out of service, its contents shall be immediately safely vented or transferred to another storage vessel per the owner's written safety procedures.

2) If a fitness-for-service examination is to be conducted, the original vessel manufacturer shall be contacted as soon as possible after the rejectable defects have been found. The manufacturer shall then determine the vessel fitness-for-service by applicable techniques, i.e., acoustic emission testing, ultra-sonic testing, and/or other feasible methods. The manufacturer shall have documentation that the evaluation method(s) used is satisfactory for determining the condition of the vessel. Repairs to the outer protective layer may be made by a R certificate holder other than the original manufacturer following the original manufacturer's instructions.

Table 1 - Visual Acceptance/ Rejection Criteria for Composite Pressure Vessels

Type of Degradation or Damage	Description of Degradation or Damage	Acceptable Level of Degradation or Damage	Rejectable Level of Degradation or Damage
Abrasion	Abrasion is damage to the filaments caused by wearing or rubbing of the surface by friction	Less than 0.050 in. depth in the pressure bearing thickness.	$\geq$ 0.050 in. depth in the pressure bearing thickness
Cuts	Linear indications flaws caused by an impact with a sharp object	Less than 0.050 in. depth in the pressure bearing thickness.	$\geq$ 0.050 in. depth in the pressure bearing thickness
Impact Damage	Damage to the vessel caused by striking the vessel with an object or by being dropped. This may be indicated by discoloration of the composite or broken filaments and/or cracking.	Slight damage that causes a frosted appearance or hairline cracking of the resin in the impact area	Any permanent deformation of the vessel or damaged filaments
Delamination	Lifting or separation of the filaments due to impact, a cut, or fabrication error.	Minor delamination of the exterior coating	Any loose filament ends showing on the surface. Any bulging due to interior delaminations
Heat or Fire Damage	Discoloration, charring or distortion of the composite due to temperatures beyond the curing temperature of the composite	Merely soiled by soot or other debris, such that the cylinder can be washed with no residue	Any evidence of thermal degradation or discoloration or distortion

Structural Damage - bulging, distortion, depressions	Change in shape of the vessel due to sever impact or dropping	None	Any visible distortion, bulging, or depression
Chemical attack	Environmental exposure that causes a change in the composite or failure of the filaments	Any attack that can be cleaned off and that leaves no residue	Any permanent discoloration or loss or softening of material under the exterior coat.
Cracks	Sharp, linear indications	None	None
Scratches/Gouges	Sharp, linear indications caused by mechanical damage.	Less than 0.050 in. depth in the pressure bearing thickness No structural fibers cut or broken	$\geq$ 0.050 in. depth in the pressure bearing thickness or structural fibers cut or broken
Soot	A deposit on the composite caused by thermal or environmental exposure	Soot that washes off and leaves no residue	Any permanent marking that will not wash off the surface under the exterior coating
Over pressurization	Excessive pressure due to operational malfunction	None reported	Any report of pressurization beyond the MAWP or any indication of distortion
Corrosion	Degradation of the composite due to exposure to specific corrosive environments	None visible	Any surface damage to structural identified as corrosion
Dents	A depression in the exterior of the vessel caused by impact or dropping	< 1/16 in. in depth	Any dents with a depth $\geq$ 1/16 in. Or with a diameter greater than 2 inches

(21)

Reported collision, accident, or fire				Damage to the vessel caused by unanticipated excursion from normally expected operating conditions	None reported	Any indication or report of impact or heat damage
Environmental Damage or Weathering				Ultraviolet or other environmental attack under the exterior coating.	None	Any discoloration that can not be washed off*
Damage to a protective or sacrificial layer	Abrasion, cuts, chemical attack, scratches/gouges, corrosion, environmental damage, or crazing that are limited only to the protective or sacrificial layer.	The depth of any damage to the protective or sacrificial layer that does not exceed the thickness of the protective or sacrificial layer plus 0.050 inch.	The depth of any damage to the protective or sacrificial layer that exceeds the thickness of the protective or sacrificial layer plus 0.050 inch.	Hairline surface cracks only in the composite resin	Light hairline cracks only in the resin	Any damage to the filaments

Note: Only damage beyond the sacrificial or coated layer should be considered, and that any damage to sacrificial or coated layers should be repaired by suitable techniques (i.e. epoxy filler). Refer to ASME data report for sacrificial layer thickness.

* - Washing off UV scale will accelerate attack into lower composite layers Crazing

. For this reason, if there is superficial UV damage the affected area should be cleaned and painted with a UV tolerant paint. If broken, frayed, or separated fibers, to the non sacrificial layer, are discovered during the cleaning process then the vessel shall be condemned.

S9.5 INSPECTOR QUALIFICATIONS

The Inspector shall be familiar with vessel construction and qualified by training and experience to conduct such inspections. The Inspector should have a thorough understanding of all required inspections, tests, test apparatus, inspection procedures, and inspection techniques and equipment applicable

to the types of vessels to be inspected. The Inspector should have basic knowledge of the vessel material types and properties. Refer to Part 2 Para. S4.2.

The acoustic emission technician conducting the examination required per S9.2(c) and in accordance with S9.11 shall be certified per the guidelines of ASNT SNT-TC-1A or CP-189 AE Level II or III. A technician performing this test shall have training in and experience with measuring C_e and C_f in composites and identifying wave modes.

S9.6 ASSESSMENT OF INSTALLATION

a) The visual examination of the vessel requires that all exposed surfaces of the vessel are examined to identify any degradation, defects, mechanical damage, or environmental damage on the surface of the vessel.

The causes of damage to vessels are: (1) abrasion damage, (2) cut damage, (3) impact damage, (4) structural damage, (5) chemical or environmental exposure damage or degradation, and (6) heat or fire damage.
The types of damage found are: (1) cracks, (2) discolored areas, (3) gouges and impact damage, (4) leaks, (5) fiber exposure, (6) blisters, (7) delaminations, (8) surface degradation, and (9) broken supports.

b) The visual examination of the vessel requires that the identity of the vessel must be verified. This should include the ASME Code to which the vessel was constructed, vessel serial number, maximum allowed operating pressure, date of manufacture, vessel manufacturer, date of expiration of the service life of the vessel, and any other pertinent information shown on the vessel or available from

vessel documents. The overall condition of the vessel should be noted.

S9.7 EXTERNAL INSPECTION

a) Vessel Service Life

Vessels have been designed and manufactured for a limited lifetime; this is indicated on the vessel marking. This marking should first be checked to ensure that such vessels are within their designated service lifetime.

b) Identification of External Damage

The external surface should be inspected for damage to the laminate. Damage is classified into two levels as shown in Section 9 of these guidelines. The acceptance/rejection criteria shown in section 10 of these guidelines should be followed, as a minimum.

The external surface of the vessel is subject to mechanical, thermal, and environmental damage. The external surface of a vessel may show damage from impacts, gouging, abrasion, scratching, temperature excursions, etc. Areas of the surface that are exposed to sunlight may be degraded by ultraviolet light which results in change in the color of the surface and may make the fibers more visible. This discoloration does not indicate a loss in physical properties of the fibers. Overheating may also cause a change in color.

The size (area or length and depth) and location of all external damage should be noted.

Vessel support structures and attachments should be examined for damage such as cracks, deformation, or structural failure.

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c) Types of External Damage

1. General

Several types of damage to the exterior of vessels have been identified. Examples of specific type of damage are described below. The acceptance/rejection criteria for each type of damage are described in Table 1 of this supplement.

2. Abrasion Damage

Abrasion damage is caused by grinding or rubbing away of the exterior of the vessel. Minor abrasion damage to the protective outer coating or paint will not reduce the structural integrity of the vessel. Abrasion that results in flat spots on the surface of the vessel may indicate loss of composite fiber overwrap thickness

3. Damage from Cuts

Cuts or gouges are caused by contact with sharp objects in such a way as to cut into the composite overwrap, reducing its thickness at that point.

4. Impact Damage

Impact damage may appear as hairline cracks in the resin, delamination, or cuts of the composite fiber overwrap.

5. Delamination

Delamination is a separation of layers of fibers of the composite overwrap. It may also appear as a discoloration or a blister beneath the surface of the fiber.

6. Heat or Fire Damage

Heat or fire damage may be evident by discoloration, charring or burning of the composite fiber overwrap, labels, or paint. If there is any suspicion of damage, the vessel shall be re-qualified using an acoustic emission examination.

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7. Structural Damage

Structural damage will be evidenced by bulging, distortion, or depressions on the surface of the vessel.

8. Chemical Attack

Some chemicals are known to cause damage to composite materials. Environmental exposure or direct contact with solvents, acids, bases, alcohols, and general corrosives can cause damage to vessels. Long-term contact with water can also contribute to corrosive damage. Chemicals can dissolve, corrode, remove, or destroy vessel materials. Chemical attack can result in a significant loss of strength in the composite material. Chemical attack can appear as discoloration and in more extreme cases the composite overwrap can feel soft when touched.

S9.8 INTERNAL INSPECTION

a) Requirements for Internal Visual Inspection

Internal visual inspection is normally not required. When vessels have been filled only with pure fluids, corrosion of the interior of the liner should not occur. Internal visual inspection of the tanks should only be carried out when:

1. There is evidence that any commodity except a pure fluid has been introduced into the tank. In particular, any evidence that water, moisture, compressor cleaning solvents, or other corrosive agents have been introduced into the vessel will require an internal visual inspection.
2. There is evidence of structural damage to the vessel, such as denting or bulging.
3. The vessel valve is removed for maintenance or other reason. Internal inspection in this case is limited to inspection of the threads and sealing surface. When an internal visual inspection is conducted, the following procedures should be followed.

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b) Identification of Internal Damage

1. Vessels with Metallic Liners

For vessels with metallic liners, the objective of the internal visual inspection is primarily to detect the presence of any corrosion or corrosion cracks.
The internal surface of the vessel should be inspected with adequate illumination to identify any degradation or defects present. Any foreign matter or corrosion products should be removed from the interior of the vessel to facilitate inspection. Any chemical solutions used in the interior of the vessel should be selected to ensure that they do not adversely affect the liner or composite overwrap materials. After cleaning the vessel should be thoroughly dried before it is inspected.
All interior surfaces of the vessel should be inspected for any color differences, stains, wetness, roughness, or cracks. The location of any degradation should be noted. Any vessel showing significant internal corrosion, dents or cracks should be removed from service.

2. Vessels with Non-metallic Liners or No Liners

Vessels with non-metallic liners may show corrosion on the plastic liner or metal boss ends. Vessels with non-metallic liners or no liners may also show internal degradation in the form of cracks, pitting, exposed laminate, or porosity.
The internal surface of vessels should be inspected with adequate illumination to identify any degradation or defects present. Any foreign matter or corrosion products should be removed from the interior of the vessel to facilitate inspection. Chemical solutions used in the interior of the vessel should be selected to ensure they do not adversely affect the liner or composite overwrap materials. After cleaning the vessel should be thoroughly dried before it is inspected.

The inspector should look for cracks, porosity, indentations, exposed fibers, blisters, and any other indication of degradation of the liner and/or laminate. Deterioration of the liner may include softening of the matrix or exposed fibers.

SX.9 INSPECTION FREQUENCY

a) Initial inspection

The vessel shall be given and external visual inspection by the Inspector or the Authority having jurisdiction after the vessel has been installed and during the initial filling operation. The inspection shall check for any damage during installation prior to initial filling and for any leaks or damage during and at the conclusion of filling.

b) Subsequent Filling Inspections

Before each refilling of the vessel, the manager of the facility shall visually inspect the vessel exterior for damage or leaks. Refilling operations shall be suspended if any damage or leaks are detected and the vessel shall be emptied and subsequently inspected by the Inspector to determine if the vessel shall remain in service.

c) Periodic Inspection

Within 30 days of the anniversary of the initial operation of the vessel during each year of its service life, the vessel shall be externally inspected by the Inspector or the Authority having jurisdiction. Internal inspections shall only be required if any of the conditions of S9.8 are met. These inspections are in addition to the periodic acoustic emission examination requirements of S9.2(c).

SX.10 DOCUMENT RETENTION

A detailed record of external and internal inspection shall be retained by the owner of the vessel for the life of the vessel.

After satisfactory completion of the periodic in-service inspection, vessels should be permanently marked or labeled with the date of the inspection, the mark of the Inspector, and the date of the next periodic in-service inspection. ASME data report shall be kept on file for the life of the vessel if the vessel was not registered with the National Board.

S9.11 ACOUSTIC EMISSION EXAMINATION

a) Use and Test Objectives

All Section X Class III vessels shall be subject to an acoustic emission examination to detect damage that may occur while the vessel is in service. This method may be used in conjunction with the normal filling procedure.

b) Test Procedure

AE transducers shall be acoustically coupled to the vessel under test and connected to waveform recording equipment. Waveforms shall be recorded and stored on digital media as the vessel is pressurized. All analysis shall be done on the waveforms. The waveforms of interest are the E (Extensional Mode) and F (Flexural Mode) plate waves.

Prior to pressurization, the velocities of the earliest arriving frequency in the E wave and the latest arriving frequency in the F wave shall be measured in the circumferential direction in order to characterize the material and set the sample time (the length of the wave window).

The E and F waves must be digitized and stored for analysis. The test pressure shall be recorded simultaneously with the AE events. Permanent storage of the waveforms is required for the life of the vessel.

c) Equipment

1. Testing System

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A testing system shall consist of 1) sensors, 2) preamplifiers, 3) high pass and low pass filters, 4) amplifier, 5) A/D (analog-to-digital) converters, 6) a computer program for the collection of data, 7) computer and monitor for the display of data, and

8) a computer program for analysis of data. Examination of the waveforms event by event must always be possible and the waveforms for each event must correspond precisely with the pressure and time data during the test. The computer program shall be capable of detecting the first arrival channel. This is critical to the acceptance criteria below. Sensors and recording equipment shall be checked for a current calibration sticker or a current certificate of calibration.

2. Sensor Calibration

Sensors shall have a flat frequency response from 50 kHz to 400 kHz. Deviation from flat response (signal coloration) shall be corrected by using a sensitivity curve obtained with a Michelson interferometer calibration system similar to the apparatus used by NIST (National Institute for Standards and Technology). Sensors shall have a diameter no greater than 0.5 inches for the active part of the sensor face. The aperture effect must be taken into account. Sensor sensitivity shall be at least 0.1 V/nm.

3. Scaling Fiber Break Energy

The wave energy shall be computed by the formula

$$U = \int V^2 dt / Z ,$$

which is the formula for computing energy in the AE signal, where V is the voltage and Z is the input impedance.

(30)

A rolling ball impactor shall be used to create an acoustical impulse in an aluminum plate. The measured energy in the wave shall be used to scale the fiber break energy. This scaling is illustrated later on.

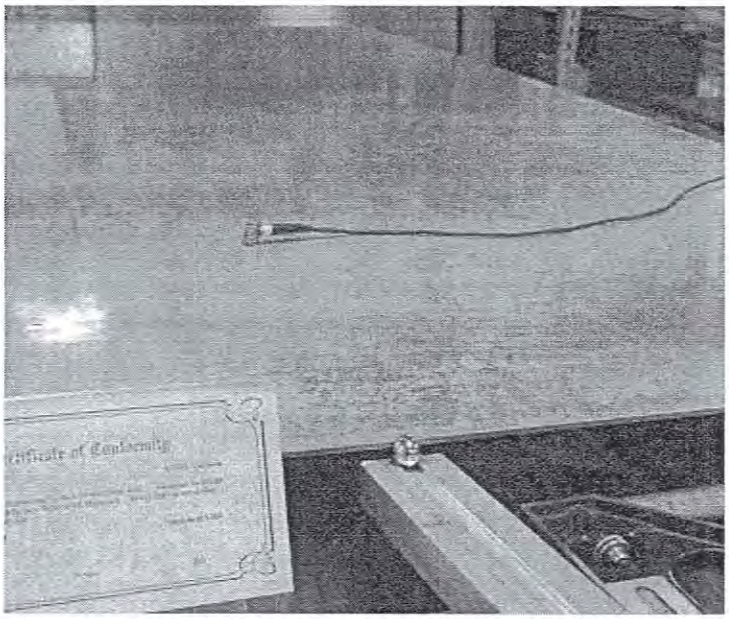

Figure 1. Rolling Ball Impact Calibration Setup.

The impact setup, an example of which is shown in Figure 1, shall be arranged as follows. The steel ball shall be ½ inch in diameter. The steel ball is a type typically used in machine shops for measuring taper and is commercially available. The ball shall made of chrome steel alloy hardened to R/C 63, ground and lapped to a surface finish of 1.5 micro-inch, within .0001 of actual size and sphericity within 0.000025 inch. The plate shall be made of 7075 T6 aluminum, be at least 4′ x 4′ in size, the larger the better to avoid reflections, be 1/8″ in thickness and be simply supported by steel blocks. The inclined plane shall be aluminum with a machined square groove 3/8″ wide which supports the ball and guides it to the impact point. The top surface of the inclined plane shall be positioned next to the edge of the plate and stationed below the lower edge of the plate such that the ball impacts with equal parts of the ball projecting above and below the plane of the plate. A mechanical release mechanism shall be used to release the ball down the plane.

The ball roll length shall be 12" and the inclined plane angle shall be six degrees. The impact produces an impulse that propagates to sensors coupled to the surface of the plate twelve inches away from the edge. The sensors shall

be coupled to the plate with vacuum grease. The energy of the leading edge of the impulse, known as the wave front shall be measured. The vertical position of the ball impact point shall be adjusted gradually in order to "peak up" the acoustical signal, much as is done in ultrasonic testing where the angle is varied slightly to peak up the response. The center frequency of the first cycle of the E wave shall be confirmed as 125 kHz ± 10 kHz. See Figure 2. The energy value in joules of the first half cycle of the E wave shall be used to scale the fiber break energy in criterion 2, as illustrated there. This shall be an "end to end" calibration meaning that the energy shall be measured using the complete AE instrumentation (sensor, cables, preamplifiers, amplifiers, filters and digitizer) that are to be used in the actual testing situation.

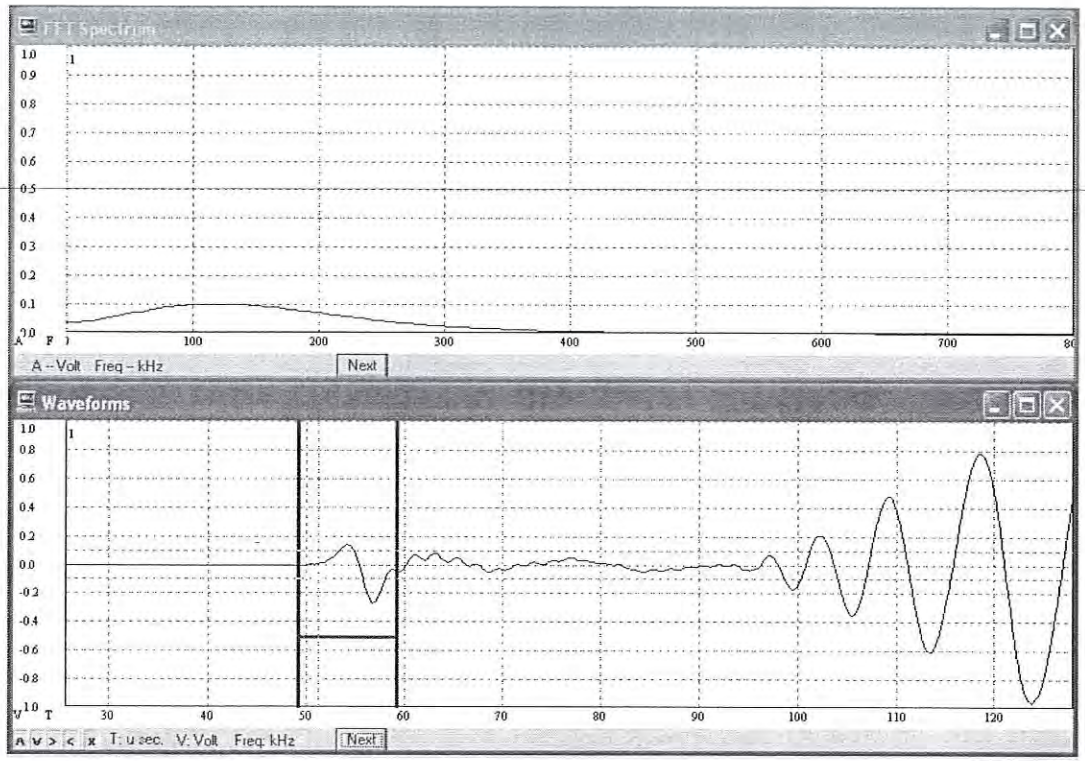

Figure 2. Front End Waveform

Front end of waveform created by rolling ball impact calibration setup described herein. FFT shows center frequency of first cycle is approximately 125kHz.

The energy linearity of the complete AE instrumentation (sensor, cables, preamplifiers, amplifiers, filters and digitizer) shall be measured by using different roll lengths of 8, 12 and 16 inches. The start of the E wave shall be from the first cycle of the waveform recognizable as the front end of the E wave to the end of the E wave which shall be taken as 10 µs later. (The time was calculated from the dispersion curves for the specified aluminum plate.) A linear regression shall be applied to the energy data and a goodness of fit $R^2 > 0.9$ shall be obtained.

4. Preamplifiers and Amplifiers - See ASME Sec. V Article 11.

5. Filters

A high pass filter of 20 kHz shall be used. A low pass filter shall be applied to prevent digital aliasing that occurs if frequencies higher than the Nyquist frequency (half the Sampling Rate) are in the signal.

6. A/D

The sampling speed and memory depth (wave window length) are dictated by the test requirements and calculated as follows: Vessel length = L inches (meters). Use C_E = 0.2 in./μs (5080 m/s) and C_F = 0.05 in./μs (1270 m/s), the speeds of the first arriving frequency in the E wave and last arriving frequency in the F wave, respectively, as a guide. The actual dispersion curves for the material shall be used if available.

L / C_E = T1 μs. This is when the first part of the direct E wave will arrive.

L / C_F = T2 μs. This is when the last part of the direct F wave will arrive.

(T2 - T1) x.1.5 is the minimum waveform window time and allows for pretrigger time.

The recording shall be quiescent before front end of the E wave arrives. This is called a "clean front end". Clean is defined in SX.11(f)(2)(b)below.

The sampling rate, or sampling speed, shall be such that aliasing does not occur.

The recording system (consisting of all amplifiers, filters and digitizers beyond the sensor) shall be calibrated by using a 20 cycle long tone burst with 0.1 V amplitude at 100, 200, 300, and 400 kHz. The system shall display an energy of $U= (V^2 \cdot N \cdot T)/2Z$ joules at each frequency, where V=0.1 volts, N = 20, Z is the preamplifier input impedance and T is the period of the cycle.

d) Sensor Placement

At least two sensors shall be used in any AE test regardless of vessel size so that EMI is easily detected by simultaneity of arrival.

Sensors shall be placed at equal distances around the circumference of the vessel on the cylindrical portion of the vessel adjacent to the tangent point of the dome such that the distance between sensors does not exceed 24 inches. Adjacent rings of sensors shall be offset by ½ a cycle. For example if the first ring of sensors is placed at 0, 120 and 240 degrees, the second ring of sensors is placed at 60, 180 and 300 degrees. This pattern shall be continued along the vessel length at evenly spaced intervals, such intervals not to exceed two feet, until the other end of the vessel is reached. See Figure 3. The diameter referred to is the external diameter of a vessel.

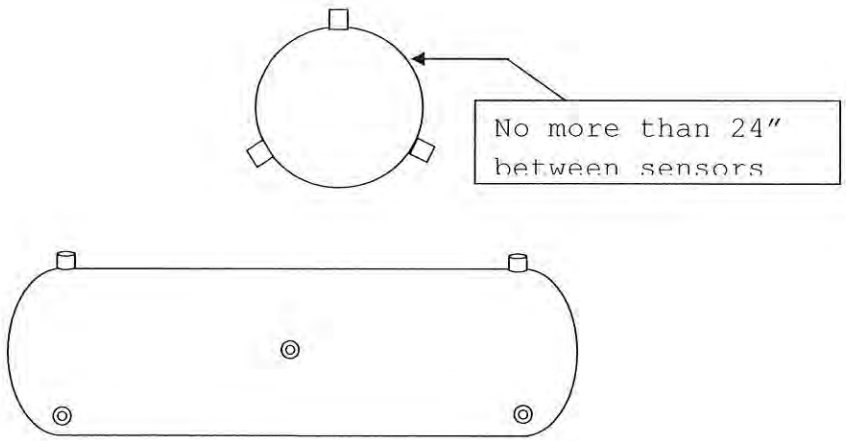

Figure 3. Sensor spacing and pattern.

Maximum distance between sensors in the axial and circumferential directions shall not exceed two feet unless it is demonstrated that the essential data can still be obtained using a greater distance and the authority having the jurisdiction concurs.

This spacing allows for capturing the higher frequency components of the acoustic emission impulses and high channel count wave recording systems are readily available.

e) Test Procedure

Couple sensors to vessel and connect to the testing equipment per Section V Article 11. Connect pressure transducer to the recorder. Conduct sensor performance checks prior to test to verify proper operation and good coupling to the vessel. The E and F waveforms shall be observed by breaking pencil lead at approximately 8 in. (20 cm) and 16 in. (40.6 cm) from a sensor along the fiber direction. All calibration data shall be recorded.

Recording threshold shall 60 dB re 1 μV at the transducer.

Performance checks shall be carried out by pencil lead breaks (Pentel 0.3 mm, 2H) six inches from each transducer in the axial direction of the cylinder and a break at the center of each group of four sensors.

Pressurize vessel to >98% of normal fill pressure and monitor AE during pressurization and for 15 minutes after fill pressure is reached. See Figure 4 for a schematic of the pressurization scheme. If at any time during fill the fill rate is too high in that it causes flow noise, decrease fill rate until flow noise disappears. Record events during pressurization and for 15 minutes after fill pressure is reached and save the data. Then conduct a post-test performance check and save data. Test temperature shall be between 50°F (10°C) 120°F (49°C).

A threshold of 60 dBAE ref 1 μV at the sensor shall be used during all phases of testing.

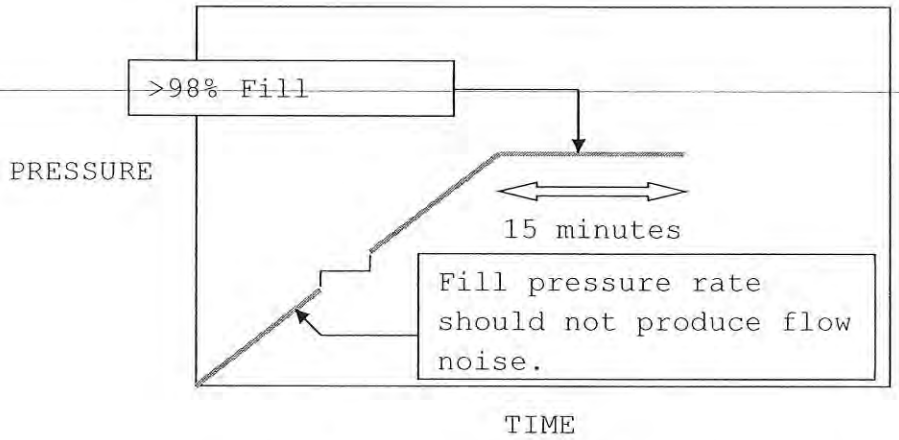

Figure 4. Typical Pressurization Plan When Filling Vessels.

AE shall be monitored for 15 min after operating fill pressure is reached.

f) Accept/Reject Criteria

1. Stability Criterion

Theory of AE Monitoring of high pressure composite pressure vessels for stability - A stable vessel will exhibit cumulative curves with exponentially decaying curvature. The shape of the cumulative events curve is similar for pressure vessels made of fiberglass, aramid and carbon fiber that exhibit a fiber dominated failure mode. This is essentially a test that demonstrates the composite is not progressing to failure at the hold pressure.

2. Analysis Procedure

Data will include matrix splits, matrix cracks, fiber breaks, and matrix chirps due to fracture surface fretting, and fiber/matrix debonding. Extraneous noise, identified by waveform characteristics, may also be included in the data.

a. Filter data to eliminate any external noise such as electromagnetic interference (EMI), mechanical rubbing, flow noise, etc. Identify noise events by their shape, spectral characteristics, or other information known about the test such as a temporally associated disturbance due to the pressurization system or test fixturing. EMI is characterized

by a lack of any mechanical wave propagation characteristics, particularly a lack of dispersion being apparent. EMI can be further identified by simultaneity of arrival on more than one channel. The two criteria shall be considered together to ensure it's not simply an event that happened to be centered between the sensors. Mechanical rubbing frequencies are usually very low and can be determined by experiment. There should be no flow noise. If the vessel, or a fitting, leaks, this will compromise the data as AE is very sensitive to leaks. Leak noise is characterized by waves that look uniform across the entire length of the waveform window. If a leak occurs during the load hold, the test must be redone. Flow noise is characterized by waves that fill the waveform window.

b. Use only events that have clean front ends and in which first arrival channel can be determined. Clean means having a pre-trigger energy of less than 0.01×10^{-10} joules. Energy is computed by the integral of the voltage squared over time.

c. Plot first arrival cumulative events versus time. Plots shall always show the pressure data.

d. Apply exponential fits by channel for pressure hold time and display both data and fit. The values are determined by the fit to $y = Ae^{Bt} + C$.

The B value is the shape factor of the cumulative curves. C is an intercept and A is a scale factor. The time t shall be equal intervals during the hold with events binned by time interval. Record exponents and goodness of fit (R^2). Plot energy decay curves. One third or one fourth of hold time shall be used for event energy binning (cumulative energy). The formula is $y=Ae^{Bt}$.
The sequence of energy values must monotonically decrease. This is similar to using other energy criteria, such as Historic Index. A sequence that is not properly decreasing will be indicated by a low R^2 value.

e. Save all plots (all channels) to report document.

f. Record exponents and R^2 values.

g. Vessel B values shall be tracked and compiled in order to develop a statistically significant database.
ii) B is the critical value that measures the frequency of occurrence of events during pressure hold.
iii) Not every vessel will have the exact same B value.
iv) Data on B values should cluster.

The criteria given below apply to each individual sensor on the vessel.

1. The stability criteria as described above shall be met. (Also see ASME Section X Mandatory Appendix 8.) Any vessel that does not meet the stability criteria must be removed from service. The criteria are:

a. Cumulative Event Decay Rate $-0.1 < B < -0.0001$, $R^2 \geq 0.80$
b. Cumulative Energy Decay Rate $-0.2 < B < -0.001$, $R^2 \geq 0.80$

If these criteria are not met, the vessel does not pass. The vessel may be retested. An AE Level III inspector must review the data from the initial testing and the subsequent loading test before the vessel can be passed. Retest loadings shall follow the original pressurization rates and pressures and use a threshold of 60 dBAE. If the vessel fails the criteria again, the vessel shall not be certified by the Inspector as meeting the provisions of this Section.

2. Events that occur at the higher loads during pressurization having significant energy in the frequency band $f > 300$ kHz are due to fiber bundle, or partial bundle, breaks. These should not be present at operating pressure in a vessel that has been tested to a much higher pressures and is now operated at the much lower service pressure. For fiber bundles to break in the upper twenty percent of load during the test cycle or while holding at operating pressure, the vessel has a severe stress concentration and shall be removed from service.

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g) Fiber Breakage Criterion

1. Analysis Procedure

In order to determine if fiber bundle breakage has occurred during the filling operation the frequency spectra of the direct E and F waves shall be examined and the energies in certain frequency ranges shall be computed as given below.

2. Definitions

Energies (U) in the ranges are defined as
50 - 400 kHz: U_0
100 - 200 kHz: U_1
250 - 400 kHz: U_2

The criteria for determining if high frequency spectrum events have occurred is given by the following formulas:
$U_0 / (U_{FBB}) \geq 10\%$
$U_2 / (U_1 + U_2) \geq 15\%$
$U_2 / U_0 \geq 10\%$

U_{FBB} is the energy of a fiber bundle break calculated using the average breaking strength found in the literature, either from the manufacturer's data or independent test data. The formula that shall be used for calculating average fiber break energy is

$$U_{FB} = \frac{E\varepsilon^2}{2} Al ,$$

where ε is the strain to failure of the fiber, E the Young's modulus of the fiber, A is area of the fiber and l is the ineffective fiber length for the fiber and matrix combination. If the ineffective length is not readily available, four (4) times the fiber diameter shall be used. We take U_{FBB} = 100 x U_{FB}, where U_{FB} has been calculated and scaled by the rolling ball impact energy as in the examples below. If these criteria are met, fiber bundle break damage has occurred during the test and the vessel should be removed from service.

3. Example of Fiber Break Energy Calculation

Suppose d = 7 μm, E = 69.6 GPa and ε = 0.01 (average breaking strain) for some carbon fiber. Using $A = \pi d^2/4$ and l = 4d,

$$U_{FB} = 3\text{x}10^{-8} \text{ J}.$$

4. Example of Scaling Calculation

Suppose that the rolling ball impact (RBI) acoustical energy measured by a particular high fidelity AE transducer is $U^{AE}_{RBI} = 5 \text{ x } 10^{-10}$ J and the impact energy $U_{RBI} = 1.9 \text{ x } 10^{-3}$ J (due to gravity). Fiber break energy of T300 carbon fiber $U_{FB} = 3\text{x}10^{-8}$ J would correspond to a wave energy

$$U^{AE}_{FB} = U_{FB} \text{ x } U^{AE}_{RBI} / U_{RBI}$$

$$= 3\text{x}10^{-8} \text{ J x } 5 \text{ x } 10^{-10} \text{ J / } 1.9 \text{ x } 10^{-3} \text{ J}$$

$$= 7.9 \text{ x } 10^{-15} \text{ J}.$$

This is the number that is used to calculate the value of U_{FBB} that is used in the fiber break criterion in this the second acceptance criterion and the energy acceptance criterion in the third criterion below.

5. Amplifier Gain Correction

All energies shall be corrected for gain. (20 dB gain increases apparent energy 100 times and 40 dB gain 10,000 times.)

Fiber break waves may look similar to matrix event waves in time space but in frequency space the difference is clear. A fiber break is a very fast source, while a matrix crack evolves much more slowly due to greater than ten to one difference in their tensile moduli. The speed of the fiber break produces the high frequencies, much higher than a matrix crack event can produce. Frequencies higher than 2 MHz have been observed in proximity to a fiber break, however these very high frequencies are attenuated rapidly as the wave propagates. Practically speaking, the observation of frequencies above 300 kHz, combined with certain other

characteristics of the frequency spectrum and pressure level, is enough to confirm a fiber break. It should also be noted that it is fiber bundle breaks that are usually detected in structural testing and not the breaking of individual fibers. The energies of individual fiber breaks are very small, about $3x10^{-8}$ Joules for T-300 carbon fibers for example.

h) Friction between Fracture Surfaces

Friction between fracture surfaces plays a very important role in understanding AE in fatigue testing. It is an indicator of the presence of damage because it is produced by the frictional rubbing between existing and newly created fracture surfaces. Even the presence of fiber bundle breakage can be detected by examining the waveforms produced by frictional acoustic emission or FRAE. Increasing FRAE intensity throughout a pressure cycle means more and more damage has occurred.
Therefore, for a vessel to pass, no AE event shall have an energy greater than (F) x U_{FB} at anytime during the test. F is the acoustic emission allowance factor. The smaller the allowance factor, the more conservative the test. An $F = 10^4$ shall be used in this testing. It is the equivalent of three plus fiber tows, each tow consisting of 3,000 fibers, breaking simultaneously near a given transducer.

i) Background Energy

Background energy of any channel shall not exceed 10 times the quiescent background energy of that channel. After fill pressure is reached, any oscillation in background energy with a factor of two excursions between minima and maxima shows that the vessel is struggling to handle the pressure. Pressure shall be reduced immediately and the vessel removed from service.

NB11-1101

New Item

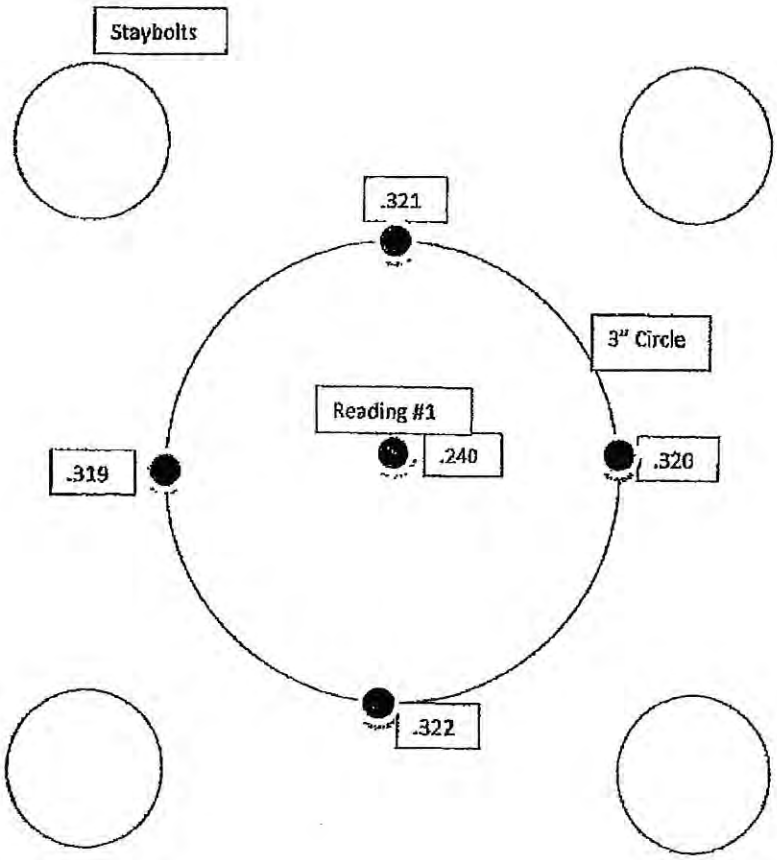
Request for Code Change below to address thickness readings for adjusting MAWP if general or localized pitting is observed.

Part II, Section 6, Paragraph S2.6.2 b) should be revised to provide more guidance for evaluating local pitting corrosion versus general corrosion. See example below;

Once region of corrosion pitting is detected by UT (.240" in the attached illustration), a three-inch circle should be drawn around the pitted region. After four readings around the perimeter of the circle are determined by UT and show significant difference with the original lowest reading, the lowest of the four readings should be used as the actual thickness for that particular subsection of the boiler (e.g., the staybolt quadrant as shown, or the grid section of the barrel).
The lowest center reading is assumed to be a localized pit, and can be disregarded in the MAWP calculation because of surrounding material that provides some level of reinforcement.

Sample Readings

Exhibit 1



Requested Revisions and Additions

CURRENT WORDING – NBIC Part 2, SECTION 5 5.2 – 5.2.3

5.2 REPLACEMENT OF STAMPING DURING INSERVICE INSPECTION

5.2.1 AUTHORIZATION

a) When the stamping on a pressure-retaining item becomes indistinct or the nameplate is lost, illegible, or detached, but traceability to the original pressure-retaining item is still possible, the Inspector shall instruct the owner or user to have the stamped data replaced. All re-stamping shall be done in accordance with the original code of construction, except as modified herein. Requests for permission to re-stamp or replace nameplates shall be made to the Jurisdiction in which the pressure-retaining item is installed. Application must be made on the Replacement of Stamped Data Form, NB-136 (see 5.3.2). Proof of the original stamping and other such data, as is available shall be furnished with the request. Permission from the Jurisdiction is not required for the reattachment of nameplates that are partially attached. When traceability cannot be established, the Jurisdiction shall be contacted.

b) When there is no Jurisdiction, the replacement of stamped data shall be authorized and witnessed by a National Board Commissioned Inspector and the completed Form NB-136 (see 5.3.2) shall be submitted to the National Board.

5.2.2 REPLACEMENT OF STAMPED DATA

a) The re-stamping or replacement of data shall be witnessed by a National Board Commissioned Inspector and shall be identical to the original stamping.

b) The Re-stamping or replacement of a code symbol stamp shall be performed only as permitted by the governing code of construction.

c) Replacement nameplates shall be clearly marked "replacement".

5.2.3 REPORTING

Form NB-136 shall be filed with the Jurisdiction (if required) or the National Board by the owner or user together with a facsimile of the stamping or nameplate, as applied, and shall also bear the signature of the National Board Commissioned Inspector who witnessed the replacement.

PROPOSED CHANGES– NBIC Part 2, SECTION 5, 5.2 – 5.2.3

5.2 REPLACEMENT OF STAMPING ~~DURING INSERVICE INSPECTION~~OR NAMEPLATE

5.2.1 AUTHORIZATION

a) When the stamping on a pressure-retaining item becomes indistinct or the nameplate is lost, illegible, or detached, but traceability to the original pressure-retaining item is still possible, the Inspector shall ~~instruct~~ require ~~the owner or user to shall have~~ the nameplate or stamped data to be replaced. All re-stamping shall be done in accordance with the original code of construction, except as modified herein. ~~Requests for permission to re-stamped or replaced nameplates shall be made to the Jurisdiction in which the pressure-retaining item is installed. Application~~ Documentation must be made on the Replacement of Stamped Data Form, NB-136 (see 5.3.2). Proof of the original stamping and other such data, as is available shall be furnished ~~with the request~~ to the Inspector (not required for the reattachment of nameplates that are partially attached). ~~Permission from the Jurisdiction~~ Completion of an NB-136 is not required for the reattachment of nameplates that are partially attached. Notification of re-stamping or replacement nameplates shall be made to the Jurisdiction in which the pressure-retaining item is installed. When traceability cannot be established, the Jurisdiction shall be contacted.

b) When there is no Jurisdiction, the replacement of stamped data shall be authorized and ~~witnessed~~ verified by a National Board Commissioned Inspector and the completed Form NB-136 (see 5.3.2) shall be submitted to ~~t~~The National Board.

5.2.2 REPLACEMENT OF STAMPED DATA OR NAMEPLATE

a) The re-stamping or replacement of ~~data~~ a nameplate shall be ~~witnessed~~ verified and accepted by a National Board Commissioned Inspector. ~~and shall be identical to the original stamping.~~

b) The ~~R~~re-stamping or replacement of a code symbol stamp shall be performed only as permitted by the governing code of construction.

c) Replacement nameplates shall be clearly ~~marked~~ stamped "~~replacement~~REPLACEMENT".

5.2.3 REPORTING

Form NB-136 shall be filed with the Jurisdiction (if required) and ~~or~~ ~~t~~The National Board by the owner or user ~~together with~~ documenting a facsimile of the stamping or nameplate, as applied, and shall also bear the signature of the National Board Commissioned Inspector who ~~witnessed~~ verified the replacement.

PROPOSED NEW WORDING– NBIC Part 2, SECTION 5, 5.2 – 5.2.3

5.2 REPLACEMENT OF STAMPING OR NAMEPLATE

5.2.1 AUTHORIZATION

a) When the stamping on a pressure-retaining item becomes indistinct or the nameplate is lost, illegible, or detached, but traceability to the original pressure-retaining item is still possible, the Inspector shall require the nameplate or stamped data to be replaced. All re-stamping shall be done in accordance with the original code of construction, except as modified herein. Documentation must be made on the Replacement of Stamped Data Form, NB-136 (see 5.3.2). Proof of the original stamping and other such data, as is available shall be furnished to the Inspector (not required for the reattachment of nameplates that are partially attached). Completion of an NB-136 is not required for the reattachment of nameplates that are partially attached. Notification of re-stamping or replacement nameplates shall be made to the Jurisdiction in which the pressure-retaining item is installed. When traceability cannot be established, the Jurisdiction shall be contacted.

b) When there is no Jurisdiction, the replacement of stamped data shall be authorized and verified by a National Board Commissioned Inspector and the completed Form NB-136 (see 5.3.2) shall be submitted to The National Board.

5.2.2 REPLACEMENT OF STAMPED DATA OR NAMEPLATE

a) The re-stamping or replacement of a nameplate shall be verified and accepted by a National Board Commissioned Inspector.

b) The re-stamping or replacement of a code symbol stamp shall be performed only as permitted by the governing code of construction.

c) Replacement nameplates shall be clearly stamped "REPLACEMENT".

5.2.3 REPORTING

Form NB-136 shall be filed with the Jurisdiction (if required) and The National Board by the owner or user documenting a facsimile of the stamping or nameplate, as applied, and shall also bear the signature of the National Board Commissioned Inspector who verified the replacement.

NB-136 REPLACEMENT OF STAMPED DATA FORM

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

Submitted to:

(name ~~of jurisdiction~~)

(address)

(telephone no.)

Submitted by

(name of owner or certificate holder)

(address)

(telephone no.)

1. Manufactured by (name and address)
2. Manufactured for (name and address)
3. Location of Installation (address)
4. Date Installed
5. Previously installed at
6. Manufacturer's Data Report Attached ☐No ☐Yes
7. Item registered with National Board ☐No ☐Yes, NB Number
8. Item identification Year built
   Type Dimensions
   Mfg. Serial no. Jurisdiction no.
   MAWP psi Safety relief valve set at psi
9. Complete ~~the reverse side of~~ this report with a true facsimile of the legible portion of the nameplate or:
10. If nameplate is lost or illegible, traceability documentation shall be ~~attached~~ available to the Inspector identifying the stamping or nameplate to the object ~~to~~ and the Manufacturer's Data Report (if available) referenced on this form.

~~11. I request authorization to replace the stamped data and/or nameplate on the above described pressure-retaining item in accordance with the rules of the *National Board Inspection Code* (NBIC).~~

~~Owner or User's nOrganization Name~~

~~Signature~~ ~~Date~~

~~Title~~

~~12. Authorization is granted to replace the stamped data or to replace the nameplate of the above described pressure-retaining item.~~

~~Signature~~ ~~Date~~

~~(chief inspector or authorized representative)~~

~~Jurisdiction~~

46

The following is a true facsimile of the legible portion of the item's existing nameplate, (if applicable). Please print. Where possible, also attach a rubbing of the nameplate.

The following is a true facsimile of the item's replacement nameplate

ADDED

I certify that to the best of my knowledge and belief, the statements in this report are correct, and that the replacement information, data, and identification numbers are correct and in accordance with provisions of the *National Board Inspection code*. ~~Attached is a facsimile or rubbing of the stamping or nameplate.~~

Name of Owner or User or Certificate Holder _____

Signature _____ Date _____
(Authorized representative)

Witnessed by _____ Employer _____
(Name of inspector)

Signature _____ Date _____ NB Commission _____
(Name of inspector)

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NB-136 REPLACEMENT OF STAMPED DATA FORM

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

Submit to:

(name)

(address)

(telephone no.)

Submitted by

(name of owner or certificate holder)

(address)

(telephone no.)

1. Manufactured by _____ (name and address)
2. Manufactured for _____ (name and address)
3. Location of Installation _____ (address)
4. Date Installed _____
5. Previously installed at _____
6. Manufacturer's Data Report Attached ☐No ☐Yes
7. Item registered with National Board ☐No ☐Yes, NB Number _____
8. Item identification Year built _____

   Type _____ Dimensions _____

   Mfg. Serial no. _____ Jurisdiction no. _____

   MAWP _____ psi Safety relief valve set at _____ psi
9. Complete this report with a true facsimile of the legible portion of the nameplate or:
10. If nameplate is lost or illegible, traceability documentation shall be available to the Inspector identifying the stamping or nameplate to the object and the Manufacturer's Data Report (if available) referenced on this form.

The following is a true facsimile of the legible portion of the item's existing nameplate, (if applicable). Please print. Where possible, also attach a rubbing of the nameplate.

Inspection _____ 6/9

The following is a true facsimile of the item's replacement nameplate

I certify that to the best of my knowledge and belief, the statements in this report are correct, and that the replacement information, data, and identification numbers are correct and in accordance with provisions of the *National Board Inspection code*.

Name of Owner or User or Certificate Holder _____

Signature _____ Date _____
(Authorized representative)

Witnessed by _____ Employer _____
(Name of inspector)

Signature _____ Date _____ NB Commission _____
(Name of inspector)

CURRENT NB-136 FORM

NB-136 REPLACEMENT OF STAMPED DATA FORM

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

Submitted to

(name of jurisdiction)

(address)

(telephone no.)

Submitted by

(name of owner)

(address)

(telephone no.)

1. Manufactured by (name and address)
2. Manufactured for (name and address)
3. Location of Installation (address)
4. Date Installed
5. Previously installed at
6. Manufacturer's Data Report Attached ☐No ☐Yes
7. Item registered with National Board ☐No ☐Yes, NB Number
8. Item identification
   Year built
   Type
   Dimensions
   Mfg. Serial no.
   Jurisdiction no.
   MAWP psi Safety relief valve set at psi
9. Complete the reverse side of this report with a true facsimile of the legible portion of the nameplate.
10. If nameplate is lost or illegible, documentation shall be attached identifying the object to the Manufacturer's Data Report referenced on this form.

11. I request authorization to replace the stamped data and/or nameplate on the above described pressure-retaining item in accordance with the rules of the *National Board Inspection Code* (NBIC).

    Owner or User's name

    Signature Date

    Title

12. Authorization is granted to replace the stamped data or to replace the nameplate of the above described pressure-retaining item.

    Signature Date
    (chief inspector or authorized representative)

    Inspection Jurisdiction

8/9

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CURRENT NB-136 FORM

The following is a true facsimile of the legible portion of the item's nameplate. Please print. Where possible, also attach a rubbing of the nameplate.

I certify that to the best of my knowledge and belief, the statements in this report are correct, and that the replacement information, data, and identification numbers are correct and in accordance with provisions of the *National Board Inspection code*. Attached is a facsimile or rubbing of the stamping or nameplate.

Name of Owner or User _____

Signature _____ Date _____
(Authorized representative)

Witnessed by _____ Employer _____
(Name of inspector)

Signature _____ Date _____ NB Commission _____
(Name of inspector)

Proposed revision NBIC Part 2, sections 4.4.7 and 4.4.8

30 August 2012

Purpose: Request for consideration of Code revision

Background: NBIC Part 2, 4.4.7 Determining Inspection Intervals, addresses the process for establishing the inspection interval for a PRI based on the as-found condition of a PRI. Section 4.4.7.2 Method for Estimating Inspection Intervals for Exposure to Corrosion, provides a list of items guiding the Code user through the process of establishing an inspection interval for a PRI having corrosion damage, except for list item "j" Local Metal Loss, which contains guidance for evaluation or PRI having local thin areas.

NBIC Part 2, 4.4.8.7 Evaluating Pressure-Retaining Items Containing Local Thin Areas specifically addresses local thin area created by pitting.

It is requested that list item "j", in part, be relocated to 4.4.8.7 Evaluating Pressure-Retaining Items Containing Local Thin Areas, with the relocated text place between current list items "e" and "f" of section 4.4.8.7 with the existing list items following this insert then re-designated as list items "g" and "h" respectively.

Proposal is shown on following pages.

The objective is to move the "evaluation" guidance currently in 4.4.7 to section 4.4.8 which addresses "evaluation", making the Code more user-friendly.

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c) Damage may also be caused by mechanical forces such as thermal shock, cyclic temperature changes, vibration, pressure surges, excessive temperature, external loading, and material and fabrication defects.

4.4.7 DETERMINING INSPECTION INTERVALS

a) The maximum period between internal inspections or a complete inservice evaluation of pressure-retaining items shall not exceed one-half of the estimated remaining service life of the vessel or ten years, whichever is less. The method for estimating inspection intervals of pressure-retaining items subject to internal erosion or corrosion is discussed in NBIC Part 2, 4.4.7.1 and 4.4.7.2.

b) Inspection intervals can be revised beyond the maximum period stated above, provided the owner-user has submitted technical justification for revising the inspection interval, subject to review and acceptance by the Jurisdiction, where required.

c) Data used in engineering assessment methods to develop revised inspection intervals for pressure-retaining items shall be re-evaluated every five years, when a change in operation occurs, or after discovery of new and/or altered damage mechanisms.

4.4.7.1 METHOD FOR ESTIMATING INSPECTION INTERVALS FOR PRESSURE-RETAINING ITEMS SUBJECT TO EROSION OR CORROSION

Assessment guidelines for pressure-retaining items subject to corrosion or erosion are provided in this section. These guidelines are based on actual thickness measurements within the area of concern. Minimum required wall thickness shall be based on allowable stress of the material. Applicability and limitations of this guideline are as follows:

a) Original design criteria are known;

b) Item is not operating in the creep range;

c) Item does not contain crack-like indications;

d) Service stresses are known; and

e) Maintenance and operating history are known.

4.4.7.2 METHOD FOR ESTIMATING INSPECTION INTERVALS FOR EXPOSURE TO CORROSION

a) When the pressure-retaining item is exposed to service temperatures below the creep range, and the corrosion rate controls the remaining wall thickness of the pressure-retaining item, the inspection interval shall be calculated by the formula below or by other industry methods as accepted by the Jurisdiction.

$$\text{remaining life (years)} = \frac{t_{(actual)} - t_{(required)}}{\text{corrosion rate}}$$

$t_{(actual)}$ = thickness in inches (mm) measured at the time of inspection for the limiting section used in the determination of $t_{(required)}$

$t_{(required)}$ = minimum allowable thickness in inches (mm) for the limiting section of the pressure-retaining item or zone. It shall be the greater of the following:

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1) The calculated thickness, exclusive of the corrosion allowance, required for the pressure relieving device set pressure, static head, or other loading and design temperature, or

2) The minimum thickness permitted by the provision of the applicable Section of the original code of construction.

Corrosion Rate = inches (mm) per year of metal removal as a result of corrosion.

b) Any suitable nondestructive examination method may be used to obtain thickness measurements provided the instruments employed are calibrated in accordance with the manufacturer's specification or an acceptable national standard.

1) If suitably located existing openings are available measurements may be taken through the openings.

2) When it is impossible to determine thickness by nondestructive means, a hole may be drilled through the metal wall and thickness gage measurements taken.

c) For new pressure-retaining items or PRI's for which service conditions are being changed, one of the following methods shall be employed to determine the probable rate of corrosion from which the remaining wall thickness, at the time of the next inspection, can be estimated:

1) The corrosion rate as established by data for pressure-retaining items in the same or similar service;

2) If the probable corrosion rate cannot be determined by the above method, on-stream thickness determinations shall be made after approximately 1,000 hours of service. Subsequent sets of thickness measurements shall be taken after additional similar intervals until the corrosion rate is established.

d) Corrosion Resistant Lining
When part or all of the pressure-retaining items have a corrosion resistant lining, the interval between inspections of those sections so protected may be based on recorded experience with the same type of lining in similar service, but shall not exceed ten years, unless sufficient data has been provided to establish an alternative inspection interval. If there is no experience on which to base the interval between inspections, performance of the liner shall be monitored by a suitable means, such as the use of removable corrosion probes of the same material as the lining, ultrasonic examination, or radiography. To check the effectiveness of an internal insulation liner, metal temperatures may be obtained by surveying the pressure-retaining item with temperature measuring or indicating devices.

e) Two or More Zones
When a pressure-retaining item has two or more zones of pressure or temperature and the required thickness, corrosion allowance, or corrosion rate differ so much that the foregoing provisions give significant differences in maximum periods between inspections for the respective zones (e.g., the upper and lower portions of some fractionating towers), the period between inspections may be established individually for each zone on the basis of the condition applicable thereto, instead of being established for the entire vessel on the basis of the zone requiring the more frequent inspection.

f) Above-Ground Pressure Vessels
All pressure vessels above ground shall be given an external examination after operating the lesser of five years, or one quarter of remaining life, preferably while in operation. Alternative intervals resulting in longer periods may be assigned provided the requirements of this section have been followed. Inspection shall include determining the condition of the exterior insulation, the supports, and the general alignment of the vessel on its supports. Pressure vessels that are known to have a remaining life of over ten years or that are prevented from being exposed to external corrosion (such as being installed in a cold box in which the atmosphere is purged with an inert gas, or by the temperature being maintained sufficiently

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low or sufficiently high to preclude the presence of water), need not have the insulation removed for the external inspection. However, the condition of the insulating system and/or the outer jacketing, such as the cold box shell, shall be observed periodically and repaired if necessary.

g) Interrupted Service

1) The periods for inspection referred to above assume that the pressure-retaining item is in continuous operation, interrupted only by normal shutdown intervals. If a pressure-retaining item is out of service for an extended interval, the effect of the environmental conditions during such an interval shall be considered.

2) If the pressure-retaining item was improperly stored, exposed to a detrimental environment or the condition is suspect, it shall be given an inspection before being placed into service.

3) The date of next inspection, which was established at the previous inspection, shall be revised if damage occurred during the period of interrupted service.

h) Circumferential Stresses
For an area affected by a general corrosion in which the circumferential stresses govern the MAWP, the least thicknesses along the most critical plane of such area may be averaged over a length not exceeding:

1) The lesser of one-half the pressure vessel diameter, or 20 in. (500 mm) for vessels with inside diameters of 60 in. (1.5 m) or less, or

2) The lesser of one-third the pressure vessel diameter, or 40 in. (1 m), for vessels with inside diameters greater than 60 in. (1.5 m), except that if the area contains an opening, the distance within which thicknesses may be averaged on either side of such opening shall not extend beyond the limits of reinforcement as defined in the applicable Section of the ASME Code for ASME Stamped vessels and for other vessels in their applicable codes of construction.

Move text to follow 4.4.8.7 "e"

i) Longitudinal Stresses
If because of wind loads or other factors the longitudinal stresses would be of importance, the least thicknesses in a length of arc in the most critical plane perpendicular to the axis of the pressure vessel may be averaged for computation of the longitudinal stresses. The thicknesses used for determining corrosion rates at the respective locations shall be the most critical value of average thickness. The potential for buckling shall also be considered.

j) Local Metal Loss
Corrosion pitting shall be evaluated in accordance with NBIC Part 2, 4.4.8.7. Widely scattered corrosion pits may be left in the pressure-retaining item in accordance with the following requirements:

1) Their depth is not more than one-half the required thickness of the pressure-retaining item wall (exclusive of corrosion allowance);

2) the total area of the pits does not exceed 7 sq. in. (4500 sq mm) within any 50 sq. inches (32000 sq. mm); and

3) the sum of their dimensions (depth and width) along any straight line within this area does not exceed 2 in. (50 mm).

k) Weld Joint Efficiency Factor
When the surface at a weld having a joint efficiency factor of other than one is corroded as well as surfaces remote from the weld, an independent calculation using the appropriate weld joint efficiency factor

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7) Dimensional verification checks;

d) If visual distortion or changes in the microstructure or mechanical properties are noted, consider replacing the component or a detailed engineering analysis shall be performed to verify continued safe operation.

e) Techniques for evaluating fire damage are referenced in applicable standards. See NBIC Part 2, 1.3. A1

4.4.8.6 EVALUATING EXPOSURE OF PRESSURE-RETAINING ITEMS TO CYCLIC FATIGUE

a) A fatigue evaluation should be performed if a component is subject to cyclic operation. The allowable number of cycles (mechanical or thermal) at a given level of stress should be adequate for the specified duration of service to determine suitability for continued operation.

b) Data requirements and history information should be obtained as identified in NBIC Part 2, 4.4.5.

c) Techniques for evaluating fatigue are referenced in applicable standards. See NBIC Part 2, 1.3.

4.4.8.7 EVALUATING PRESSURE-RETAINING ITEMS CONTAINING LOCAL THIN AREAS

a) Local thin areas can result from corrosion/erosion, mechanical damage, or blend/grind techniques during fabrication or repair, and may occur internally or externally. Types of local thin areas are grooves, gouges, and pitting. When evaluating these types of flaws, the following should be considered:

1) Original design and current operating conditions;

2) Component is not operating in the creep range;

3) Material has sufficient toughness;

4) Not operating in cyclic service;

5) Does not contain crack-like indications;

6) Flaws are not located in knuckle regions of heads or conical transitions;

7) Applied loads;

8) The range of temperature or pressure fluctuation.

b) Where appropriate, crack-like indications should be removed by blend/grinding, and evaluated as a local thin area.

c) Data requirements and history information should be obtained as identified in NBIC Part 2, 4.4.5.

d) Required measurements for evaluation of local thin areas shall include:

1) Thickness profiles within the local region;

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2) Flaw dimensions;

3) Flaw to major structural discontinuity spacing;

4) Vessel geometry;

5) Material properties.

e) Required measurements for evaluation of pitting corrosion shall include:

1) Depth of the pit;

2) Diameter of the pit;

3) Shape of the pit;

4) Uniformity.

reletter to "g"

f) Widely scattered corrosion pits may be left in the pressure-retaining item in accordance with the following requirements:
1) Their depth is not more than one-half the required thickness of the pressure-retaining item wall (exclusive of corrosion allowance);
2) the total area of the pits does not exceed 7 sq. in. (4500 sq mm) within any 50 sq. inches (32000 sq. mm); and
3) the sum of their dimensions (depth and width) along any straight line within this area does not exceed 2 in. (50 mm).

f) If metal loss is less than specified corrosion/erosion allowance and adequate thickness is available for future corrosion, then monitoring techniques should be established. If metal loss is greater than specified corrosion/erosion allowance and repairs are not performed, a detailed engineering evaluation shall be performed to ensure continued safe operation.

reletter to "h"

g) Techniques for evaluating local thin areas and pitting are referenced in applicable standards. See NBIC Part 2, 1.3.

4.5 RISK-BASED INSPECTION ASSESSMENT PROGRAMS

4.5.1 SCOPE

a) This Section describes the basic elements, principles, and guidelines of a risk-based inspection (RBI) program. This Section does not address any one method but is intended to clarify the elements associated with a RBI program. Risk assessment is a process to evaluate continued safe operation of a pressure-containing component. This process is based on sound engineering practices, proven risk assessment experience, and management principles. There are numerous risk-based assessment methods being applied throughout many industries. Details for developing and implementing risk-based inspection programs are defined in other referenced standards.

Implementation of a risk-based inspection (RBI) assessment program allows an owner-user to plan inspection frequencies based on assessing probability of failure (POF) and consequence of failure (COF) (risk = POF x COF). Risk assessment programs involve a team concept based on knowledge, training and experience between engineers, inspectors, operators, analysts, financial, maintenance, and management personnel. Appropriate and responsible decisions must be made from input by all team members to ensure safe operation of systems and their components. Organizational commitment and cooperation is required to successfully implement and maintain a RBI program.

4.5.2 DEFINITIONS

COF — Consequence of Failure. Outcome from a failure. There may be one or more outcomes from a single failure.

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Reference: NBIC Part 2, Section 4, 4.4.7.2(j)(1)

Background:

Given the condition where the calculated required thickness equals 3/16 inch, a measured pit depth of 1/8 inch and an actual thickness of the pressure-retaining item measured to be 1/2 inch.

Viewing the rule in NBIC, Part 2, Section 4, 4.4.7.2(j) [where (j)2 and (j)3 are not applicable] would appear to result in the wrong conclusion. As such the rule will require either repair or evaluation per 4.4.8.7(g) then to Part 2, 1.3 and finally to API-510. All this for a condition which should have been acceptable, without repair, on the first consideration.

Request for revision, NBIC, Part 2, Section 4, 4.4.7.2(j)(1)

Current Text

j) Local Metal Loss
Corrosion pitting shall be evaluated in accordance with NBIC Part 2, 4.4.8.7. Widely scattered corrosion pits may be left in the pressure-retaining item in accordance with the following requirements:

1) Their depth is not more than one-half the required thickness of the pressure-retaining item wall (exclusive of corrosion allowance);

Proposed Text

j) Local Metal Loss
Corrosion pitting shall be evaluated in accordance with NBIC Part 2, 4.4.8.7. Widely scattered corrosion pits may be left in the pressure-retaining item in accordance with the following requirements:

1) Their depth(exclusive of corrosion allowance) is not more than one half the ~~required~~ actual thickness of the pressure-retaining item wall ~~(exclusive of corrosion allowance)~~with the remaining thickness being equal to or larger than one half the required thickness;