Date Distributed: January 21, 2016

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD SUBCOMMITTEE INSPECTION

MINUTES

Meeting of January 13th, 2016
Corpus Christi, TX

This agenda is subject to approval and for the committee use only.
They are not to be duplicated or quoted for other than committee use.

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

1. **Call to Order**
   The meeting was called to order at 8:04 am on January 13, 2016 by Mr. Mark Mooney.

2. **Introduction of Members and Visitors**
   The attendees are identified on Attendance sign in sheet (**Attachment Pages 1-2**). With the attached attendance listing, a quorum was established.

3. **Announcements**
   M. Mooney (Chairman) and J. Metzmaier (Secretary) presented announcements for the remainder of the week.

4. **Adoption of the Agenda**
   Motion was made to adopt the agenda as presented. Motion was unanimously approved.

5. **Approval of the Minutes of July 15, 2015 Meeting**
   A motion was made to approve the subcommittee on Inspection minutes from July 15, 2015. The motion was unanimously approved.

6. **Review of Rosters**

   a. **Membership Nominations**
      There were no nominations for new members to SG Inspection.

   b. **Membership Reappointments**
      Mr. Mark Mooney, Mr. Venus Newton, and Mr. Paul Welch were all eligible for reappointment to SG Installation. All reappointments were unanimously approved.

   c. **Officer Selection**
      There are no SG Installation officer positions that require a vote at this meeting.

7. **Old Business**

   i. **Interpretations**
      There are no interpretations assigned to SC Inspection.

   ii. **Action Items**

Item Number: NB07-0910	**NBIC Location: Part 2, S6**	**Attachment Pages 3-5**
General Description: Review of Part 2 S6 for completeness and accuracy **Subgroup:** Inspection **Task Group:** S. Staniszewski (PM), G. McRae, J. Riley, C. Withers **January 2016 meeting action:** S. Staniczewski presented the document passed unanimously in SG Inspection. A motion was made to approve this document. The motion was unanimously approved.		

Item Number: NB11-0204A	NBIC Location: Part 2, S2	Attachment Page 6

General Description: Review NDE requirements for stayed areas on historical boilers

Subgroup: Historical
Task Group: M. Wahl (PM), J. Larson, F. Johnson

January 2016 meeting action:
R. Underwood presented the changes passed at Historical SG. Further changes were made at the Subcommittee Inspection. A motion was made to approve the document as revised at the Subcommittee Inspection. The motion was unanimously approved.

Item Number: NB13-0903	NBIC Location: Part 2, S2.14	No Attachment

General Description: Add safety requirements for use of liquid or gaseous fuels to fire a historical boiler

Subgroup: Historical
Task Group: D. Rupert (PM), T. Dillon, J. Larson, R. Bryce

January 2016 meeting action:
R. Underwood reported to Subcommittee Inspection a progress report of no progress.

Item Number: NB13-1002	NBIC Location: Part 2	www.nbicshare.org

General Description: Review inspection requirements against ASME B31.1 Power Piping code

Subgroup: Inspection
Task Group: M. Schwartzwalder (PM), J. Frey, V. Newton, M. Mooney, D. Canonico, M. Horbaczewski, B. Dobbins

January 2016 meeting action:
M. Schwartzwalder gave a progress report. They discussed with the SG the options of adding something in to the NBIC Part 2 with regards to B31.1 or just reference to B31.1. Task group will meet and have something to present in July 2016.
-Remove B. Dobbins from the Task Group.
-Add C. Withers to the Task Group.

Item Number: NB13-1301	NBIC Location: Part 2	www.nbicshare.org

General Description: Review finite element analysis methods and how they pertain to inspection

Subgroup: Inspection
Task Group: J. Riley (PM), S. Staniszewski, M. Schwartzwalder, M. Mooney, R. Pate

January 2016 meeting action:
M. Mooney reported that there is no action needed from the Subcommittee. The item was sent back to SC due to insufficient response by the Main Committee letter ballot from July 2015

Item Number: NB13-1302	NBIC Location: Part 2	Attachment Pages 7-8

General Description: Review inspection requirements for cryogenic pressure vessels

Subgroup: Inspection
Task Group: J. Riley (PM), A. Renaldo, R. Dobbins, R. Bartley, R. Pate, D. Graf

January 2016 meeting action:
M. Mooney presented the document that was unanimously approved at Subgroup Inspection. A motion was made to approve the document. The motion was unanimously approved.

Item Number: NB13-1303	NBIC Location: Part 2	Attachment Pages 9-11

General Description: Review inspection requirements for biomass fired boilers

Subgroup: Inspection
Task Group: M. Mooney (PM), M. Horbaczewski, D. Canonico, J. Safarz

January 2016 meeting action:
M. Mooney presented the document that was unanimously approved at Subgroup Inspection. A motion was made to approve the document. The motion was unanimously approved.

Item Number: NB13-1406	NBIC Location: Part 2, S1	www.nbicshare.org

General Description: Add requirements for inspection of superheater units

Subgroup: Inspection
Task Group: R. Stone (PM)

January 2016 meeting action:
M. Mooney gave a progress report. A new project manager has been assigned. No further action to report.
-Add P. Welch (PM) & M. Mooney to the Task Group.

Item Number: NB13-1409	NBIC Location: Part 2, S1	www.nbicshare.org

General Description: Address method for analyzing bulges created by overheating in stayed boiler surfaces

Subgroup: Inspection
Task Group: M. Mooney (PM), R. Stone

January 2016 meeting action:
M. Mooney gave a progress report. A new project manager has been assigned. No further action to report.
-Add P. Welch (PM) to the Task Group.

Item Number: NB13-1701	NBIC Location: Part 2, 2.3.6.6	Attachment Pages 12-15

General Description: Review inspection requirements for wire wound pressure vessels

Subgroup: Inspection
Task Group: R. Dobbins (PM), M. Mooney, J. Riley, V. Scarcella, G. Galanes

January 2016 meeting action:
M. Horbaczewski presented document showing changes to address disapprovals from Main committee letter ballot. The document was revised by the Subcommittee Inspection group and a motion was made to approve the document. The motion was unanimously approved.
-New task group Project Manager: M. Horbaczewski.
-Remove B. Dobbins from the task group.

Item Number: NB14-0901	NBIC Location: Part 2	No Attachment

General Description: Review inspection requirements for pressure vessels designed for high pressures

Subgroup: Inspection
Task Group: M. Horbaczewski (PM), M. Schwartzwalder, D. Graf, G. Scribner

January 2016 meeting action:
M. Horbaczewski gave a progress report of no progress.

Item Number: NB14-1001	NBIC Location: Part 2, 5.2.1	Attachment Pages 16-19

General Description: Add requirements to address replacement of duplicate nameplates where the original nameplate is intact and attached to an inner vessel, where it may or may not be visible

Subgroup: Inspection
Task Group: J. Larson (PM), P. Welch, D. Ford, R. Pate, J. Getter, G. McRae, M. Horbaczewski, B. Petersen

January 2016 meeting action:
Action Item NB15-0204 & NB15-2105 have been combined with the documents this Action Item.
M. Mooney presented the changes unanimously approved at Subgroup Inspection. A motion was made to accept these changes. The motion was passed unanimously.

Item Number: NB14-1101	NBIC Location: Part 2	www.nbicshare.org

General Description: Diaphragm weld inspection.

Subgroup: Inspection
Task Group: P. Welch (PM), D. Graf, R. Stone

January 2016 meeting action:
M. Mooney gave a progress report of no progress.

Item Number: NB14-1701	NBIC Location: Part 2	No Attachment

General Description: Add diagrams for local thin areas (LTAs) for low pressure propane tanks

Subgroup: Inspection
Task Group: G. McRae (PM), T Vandini, J. Getter, M. Mooney

January 2016 meeting action:
A motion was made to close this item with no action due to no one on the committee knowing the history/origin behind this item. The motion was unanimously approved.

Item Number: NB14-1801	NBIC Location: Part 2	www.nbicshare.org

General Description: Ferrules

Subgroup: Inspection
Task Group: R. Stone (PM)

January 2016 meeting action:
M. Mooney gave a progress report. A new project manager has been assigned. No further action to report.
-Add P. Welch (PM) & M. Mooney to the Task Group.

Item Number: NB14-1802	NBIC Location: Part 2	www.nbicshare.org

General Description: Riveted staybolt head dimensions and Figure S1.2.2-c

Subgroup: Inspection
Task Group: R. Stone (PM)

January 2016 meeting action:
M. Mooney gave a progress report. A new project manager has been assigned. No further action to report.
-Add P. Welch (PM) & M. Mooney to the Task Group.

Item Number: NB15-0201	NBIC Location: Part 2	www.nbicshare.org

General Description: Provide consistent language in all areas of the NBIC affected by the closure of NB13-0701

Subgroup: Inspection
Task Group: J. Riley (PM), M. Mooney, T. Vandini, M. Clark, G. McRae

January 2016 meeting action:
M. Mooney gave a progress report. The task group should have something for the July 2016 meeting.

Item Number: NB15-0204	NBIC Location: Part 2, 5.5.2	Attachment Pages 16-19

General Description: Investigate Part 2, 5.5.2 and 5.5.3 for consistency with requirements about replacement of stamping during inservice inspection generated from NB12-1801

Subgroup: Inspection
Task Group: B. Petersen (PM), P. Welch, C. Withers

January 2016 meeting action:
This item was combined with NB14-1001 & NB15-2105 and closed with the unanimous vote of approval on NB14-1001.

Item Number: NB15-0504	NBIC Location: Part 2, S10	www.nbicshare.org

General Description: Result of PR15-0701, PR15-0702 and PR15-0703, clarify what the National Board Commissioned Inspector's specific duties are when inspecting high pressure composite vessels

Subgroup: Inspection
Task Group: E. Brantly (PM), M. Mooney, M. Horbaczewski, V. Newton

January 2016 meeting action:
M. Mooney gave a progress report of no progress. They should have something to present at the July 2016 meeting.

Item Number: NB15-0801	NBIC Location: Part 2, CO2 Supplement	Attachment Pages 20-24

General Description: Result of PR15-0602, clarify which inspection requirements for CO2 pressure vessels apply specifically to the National Board Commissioned Inspector

Subgroup: Inspection
Task Group: M. Mooney (PM), P. Welch, V. Newton, T. Barker

January 2016 meeting action:
M. Mooney presented the documents passed at Subgroup Inspection. A few revisions were made, and a motion was made to accept the revised document. The motion was unanimously passed.

Item Number: NB15-0901	NBIC Location: Part 2, CO2 Supplement	Attachment Pages 20-24

General Description: Result of PR15-0205, PR15-0206, PR15-0207, PR15-0208, PR15-0209, PR15-0210, PR15-0211 and PR15-0402, address issues in the CO2 supplement regarding requirements for inspection of equipment that are outside of the scope of insurance policies that insurance companies issue

Subgroup: Inspection
Task Group: M. Mooney (PM), P. Welch, V. Newton, T. Barker, E. Brantly

January 2016 meeting action:
A motion was made to close this item based on the unanimous vote to close NB15-0801.

Item Number: NB15-1002	NBIC Location: Part 2	Attachment Page 25

General Description: Update "stamp" vs. "certification" language to maintain consistency with ASME code

Subgroup: Inspection
Task Group: D. Graf (PM), P. Welch

January 2016 meeting action:
M. Mooney presented the document unanimously passed at Subgroup Inspection meeting. A motion was made to accept the language presented. The motion was unanimously passed.

Item Number: NB15-1601	NBIC Location: Part 2, S2.11 b) 2)	No Attachment

General Description: Requirements for the removal of jacketing/lagging insulation for inservice inspections of historical boilers

Subgroup: Historical
Task Group: T. Dillon (PM), J. Amato

January 2016 meeting action:
B. Ferrell reported to the Subcommittee that there was a progress report of no progress given at the Subgroup Historical meeting.

Item Number: NB15-2103	NBIC Location: Part 2, S7.8.6 & S7.9	Attachment Pages 26-27

General Description: Update Part 2, S7 for consistency with new requirements in Part 2, S9

Subgroup: Inspection
Task Group: D. Buechel, T. Vandini

January 2016 meeting action:
M. Mooney presented the document unanimously approved at the Subgroup Inspection meeting. A motion was made to accept this document. The motion was unanimously approved.

Item Number: NB15-2201	NBIC Location: Part 2, S10	Attachment Pages 28-33

General Description: Edit Supplement 10 on inspection of stationary high pressure composite pressure vessels

Subgroup: FRP
Task Group: None assigned

January 2016 meeting action:
M. Mooney reviewed the disapproval comments with the Subcommittee on Inspection. Changes were made and a motion was made to approve the revised document. The motion was unanimously approved.

Item Number: NB15-2304	NBIC Location: Part 2	Attachment Pages 34-39

General Description: Review NBIC footnotes; remove footnotes that are code language or definitions

Subgroup: Inspection
Task Group: M. Horbaczewski, C. Withers

January 2016 meeting action:
M. Mooney presented the document showing the changes to the footnotes which were unanimously approved at the Subgroup Inspection meeting. A motion was made to accept the changes. The motion was unanimously passed.

8. New Business

Item Number: NB15-2105	NBIC Location: Part 2, 5.2.1	Attachment Pages 16-19

General Description: Under 5.2.1 b) the last line "The completed Form NB-136....") is left over from the 2013. The reporting is all covered under 5.2.3. Reporting now so the sentence in 5.2.1 b) should be removed.

Subgroup: Inspection
Task Group: None assigned

January 2016 meeting action:
This item was combined with NB14-1001 & NB15-0204 and closed with the unanimous vote of approval on NB14-1001.

Item Number: NB15-2203	NBIC Location: Part 2, S3	No Attachment

General Description: Create diagrams of common damage mechanisms for graphite pressure equipment

Subgroup: Graphite
Task Group: None assigned

January 2016 meeting action:
No action was taken at Subcommittee Inspection, as there was no one from the Graphite subgroup to report.

Item Number: NB15-2204	NBIC Location: Part 2, S3	No Attachment

General Description: Describe post construction inspection methods specific to graphite pressure equipment

Subgroup: Graphite
Task Group: None assigned

January 2016 meeting action:
No action was taken at Subcommittee Inspection, as there was no one from the Graphite subgroup to report.

Item Number: NB15-2206A	NBIC Location: Part 2, S3	No Attachment

General Description: Review Part 2 graphite supplement to ensure proper use of "shall", "should", "may"

Subgroup: Graphite
Task Group: None assigned

January 2016 meeting action:
No action was taken at Subcommittee Inspection, as there was no one from the Graphite subgroup to report.

Item Number: NB15-2701	NBIC Location: Part 2	www.nbicshare.org

General Description: Create quick reference guide for inspection activity

Subgroup: Inspection
Task Group: None assigned

January 2016 meeting action:
M. Mooney presented the item to the group. A motion was made to close this item with no action. The SC on Inspection does not believe a quick reference guide should be created. The motion was unanimously passed.

Item Number: NB15-3501	NBIC Location: Part 2	www.nbicshare.org

General Description: Address assorted errors in Part 2, S2

Subgroup: Historical
Task Group: R. Bryce

January 2016 meeting action:
B. Underwood reported there was a progress report given at the Historical Subgroup meeting, there was no progress to be presented to the Subcommittee on Inspection.

Item Number: NB16-0201	NBIC Location: Part 2, S7	No Attachments

General Description: Ensure common terminology (i.e. Pressure Vessel) is used throughout Part 2, S7.

Subgroup: Inspection
Task Group: S. Staniszewski (PM), T. Vandini, B. Hart

January 2016 meeting action:
New item was opened. Task group assed.

9. Future Meetings

July 18-21, 2016 – Columbus, Ohio
January 9-12, 2017 – San Diego, California

10. Adjournment

A motion was made and unanimously approved to adjourn the meeting at 11:12am.

Respectfully submitted,
Jodi Metzmaier
Secretary – Part 2, Inspection

SC Inspection Attendance Sheet - 1/13/16

Name	Company	Phone Number	Email	Signature	Attend Rec.?	Guest?
Mark Mooney	Liberty Mutual	(781) 891-8900	mark.mooney@libertymutual.com		Y	N
Stanley Staniszewski	U.S. DOT	(202) 366-4545	stanley.staniszewski@dot.gov		Y	
Jodi Metzmaier	National Board	(614) 888-8320	jmetzmaier@nationalboard.org		Y	N
Timothy Barker	FM GLOBAL ~~Factory Mutual~~	360 801 3790 ~~(781) 255-4784~~	timothy.barker@fmglobal.com		Y	N
Domenic Canonico	Canonico & Assoc.	(423) 886-1008	canonicod@ebpfi.com			
David Ford	U.S. DOT	(202) 366-4545	david.ford@dot.gov			
Jim Getter	Worthington Industries	(614) 840-3087	jim.getter@worthingtonindustries.com		Y	N
Mark Horbaczewski	Diamond Technical Services	815 634 2727 ~~(634) 709-8162~~	mhorbaczewski@diamondtechnicalservices.com		Y	N
Greg McRae	Trinity Industries	(214) 589-8559	greg.mcrae@trin.net		Y	N
Venus Newton	XL ~~Boiler & Property~~ Insurance	(770) 614-3111	venus.newton@boilerproperty.com		N	N
Jim Riley	Phillips 66	(510) 245-5895	jim.riley@p66.com			
Jason Safarz	CEC Combustion Safety	(216) 749-2992	jsafarz@combustionsafety.com			
Mike Schwartzwalder	AEP	(614) 581-6456	mschwartzwalder@aep.com		Y	N
Thomas Vandini	Quality Steel Corporation	~~(419) 334-2664~~ (419) 455-3933	tvandini@propanetank.com		Y	N
Paul Welch	Arise	(678) 446-5290	paul.welch@ariseinc.com		Y	N
DARRELL GRAF	APCI	6015690534	GRAFDR@AIRPRODUCTS.com		Y	1
DAVE BUECHEL	MUNICH RE HSB	312 885-8120	DAVID.BUECHEL@HSB.COM		Y	N
CLAYTON NOVAK	STATE OF ILLINOIS	815-[redacted] 263-1144	CLAYTON.NOVAK@ILLINOIS.GOV		Y	N
ERNEST BRANTLEY	XL INSURANCE	337 842-7044	ERNEST.BRANTLEY@BPCLLC.COM		Y	N
Bonnie Petersen	Marquip Ward United	715-820 2668	bonnie.petersen@bwpapersystems.com		Y	N
TERRY CLAUSING	ASNT	513 792 2317	tclausing@virtualspectator.com		Y	N
Joe Frey	Stress Engr.	713 201 7861	joe.frey@stress.com		Y	Y

Name	Company	Phone Number	Email	Signature	Attend Rec.?	Guest?
REX SMITH	AUTHORIZED INSPECTION ASSOCIATES	(281) 751-1150	RSmith@AIALLC.ORG	[illegible]	Y	N

SUPPLEMENT 6
CONTINUED SERVICE AND INSPECTION OF DOT TRANSPORT TANKS

S6.1 SCOPE

This supplement provides rules for continued service inspections of transport tanks, i.e., cargo tanks, rail tanks, portable tanks, and ton tanks that transport dangerous goods as required in the Code of Federal Regulations, Title 49, Parts 100 through 185, and the United Nations Recommendations for Transport of Dangerous Goods-Model Regulations. This supplement, where applicable, shall be used in conjunction with other applicable Parts of the *National Board Inspection Code* (NBIC) and ASME Section XII, Rules for Construction and Continued Service of Transport Tanks. ~~*Transport Tanks*, of the *ASME Boiler and Pressure Vessel Code*.~~

S6.2 TERMINOLOGY

a) The terminology used in this supplement in some cases may be in conflict with terms and definitions normally used ~~in~~ for inspection, ~~the~~ repair, and alteration of pressure-retaining items. Considering these differences, this supplement ~~in the Definition section~~ includes a definition section, ~~has incorporated~~ listing definitions and terms specified in CFR 49, Parts 100 through 185.

b) When conflicts are identified between this part and the regulations of the ~~competent~~ Competent ~~authority~~ Authority regarding the examination, inspection, testing, repair, and maintenance for the continued qualification of transport tanks, the regulations of the Competent Authority take precedence.

c) Rules for repairs, alterations, and modifications of transport tanks are provided in NBIC Part 3, *Repairs and Alterations*, Supplement 6.

S6.3 ADMINISTRATION

a) The Competent Authority's requirements describe the frequency, scope, type of inspection (internal, external, or both), type of examination (nondestructive, spark test, etc.), and the documentation requirements for the inspection.

b) For transport tanks under the Jurisdiction of the Department of Transportation, the Registered Inspector shall have a thorough knowledge of the Code of Federal Regulations, Title 49, Parts 100 through 185.

S6.4 INSPECTION

This section ~~will~~ establishes the appropriate methods to be used for continued service inspections. ~~Inspections for repairs and modifications of~~ Specific requirements for inspections of repairs, alterations, and modifications to transport tanks ~~is~~ are located in NBIC Part 3, *Repairs and Alterations*, Supplement 6.

S6.4.1 SCOPE

This section describes the duties, qualifications, and responsibilities of the Registered Inspector, and the scope of inspection activities permitted.

S6.4.2 GENERAL REQUIREMENTS FOR INSPECTORS

a) The Inspector shall be a Registered Inspector and qualified as a National Board ~~recognized~~ Commissioned Inspector ~~, i.e.~~, Authorized Inspector (AI), Qualified Inspector (QI), or a Certified

Individual (CI), as applicable, to perform continued service inspections~~or a Registered Inspector (RI)~~. The Registered Inspector is a position established by CFR 49 Parts 100 through 185 for Continued Service Inspections. This ~~individual's~~ Inspector's duties and responsibilities are ~~subject to DOT and not ASME QAI-1.~~ identified in this supplement and subject to DOT regulations, not ASME QAI-1.

b) For continued service inspections, the owner or user's designated and qualified Registered Inspector can be used to perform inspections and testing in accordance with the Code of Federal Regulations, Title 49, Parts 100 through 185, Transportation, as stated below.

c) Inspections for continued service of transport tanks shall be performed by the type of inspector identified below for the specific class of vessel as defined in the applicable Modal Appendices of ASME Section XII and as required by the Competent Authority. Inspectors shall be a Registered Inspector and meet the following additional requirements:

1) For Class 1 vessels, Inspectors shall be designated as an Authorized Inspector regularly employed by an ASME accredited Authorized Inspection Agency (AIA). The AIA, supervisors, and inspectors shall meet the qualifications and duties as required in the latest edition of ASME QAI-1 Qualification~~s~~ for Authorized Inspection.

2) For Class 2 vessels, Inspectors shall be designated as Qualified Inspectors regularly employed by an ASME accredited Qualified Inspection Organization (QIO). The QIO, supervisors, and inspectors shall meet the qualifications and duties as required in the latest edition of ASME QAI-1, Qualifications for Authorized Inspection.

3) For Class 3 vessels, Inspectors shall be designated a Certified Individual (CI) employed full or part time by an ASME Section VIII or Section XII Certificate Holder or contractor to the Certificate Holder manufacturing DOT Transport Tanks. The CI shall meet the qualifications and duties as required in the latest edition of ASME QAI-1, Qualification for Authorized Inspection.

4) Authorized Inspection Agencies may provide inspection services for Class 2 and Class 3 vessels. Qualified Inspection Organizations may provide inspection services for Class 3 vessels.

~~b)~~5) Users may perform continued service inspections including repairs and alterations if the user possesses a valid Owner-User Inspection Organization (OUIO) Certificate of Authorization (NB-371) issued by the National Board of Boiler and Pressure Vessel Inspectors, inspectors have a current and valid NB Commission, and are employed by the OUIO.

S6.4.3 REGISTRATION OF INSPECTORS

Each ~~Registered~~ Inspector performing duties and responsibilities for continued service inspections or ~~inspections for repairs and modifications~~ as specified in this section and 49 CFR Part 180 is required to meet the qualification requirements of NBIC Part 2, S6.4.4~~, S6.4.6 and~~ through S6.4.7~~, as applicable to be registered with DOT.~~.

S6.4.4 QUALIFICATIONS OF INSPECTORS

Registered Inspector (RI) means a person registered with the US Department of Transportation (DOT) in accordance with Subpart F of Part 107 of 49 CFR who has the knowledge and ability to determine whether a ~~cargo~~ Transport tank conforms to the applicable DOT specification. A Registered Inspector may or may not be an employee of the approved facility. In addition, Registered Inspector means a person who meets, at a minimum, any one of the following:

a) Has an engineering degree and one year of work experience;

b) Has an associate degree in engineering and two years of work experience;

c) Has a high school diploma or GED and three years of work experience; and

d) Has at least three years of experience in performing the duties of a Registered Inspector by September 1, 1991, and was registered with the DOT by December 31, 1995.

S6.4.5 CODES OF CONSTRUCTION

a) The Registered Inspector is responsible to ensure that all repairs, alterations or modifications (including re-rating) are performed in accordance with the original code of construction of the transport tank.

b) For repairs, alterations, or modifications, the original code of construction for DOT vessels shall be either ASME Section VIII Division I or Section XII.

S6.4.6 INSPECTOR DUTIES FOR CONTINUED SERVICE INSPECTIONS

a) Inspectors performing Continued Service Inspections required by the Code of Federal Regulations (CFR), Title 49, Part 180 shall be a Registered Inspector. The Inspector shall satisfy the following requirements:

1) Has satisfied DOT requirements as a Registered Inspector;

2) Has successfully completed the National Board's web-based training program for Registered Inspectors and been issued a National Board certificate of completion;

3) Has received authorization from DOT as a Registered Inspector; and

4) Has been registered by DOT for the classification(s) of Transport Tanks to be inspected.

b) Inspectors performing Continued Service Inspections meeting the requirements of NBIC Part 2, S6.13 (Cargo Tanks), S6.14 (Portable Tanks), or S6.15 (Ton Tanks), and 49 CFR, Part 180 shall perform all inspections and tests required by this Section and any additional requirements, as applicable in 49CFR Part 180. The Inspections and tests shall be documented as follows:

1) All inspections and tests shall be conducted, as applicable, in accordance with NBIC Part 2, S6.13, S6.14, and S6.15;

2) All inspections and tests shall be documented in an Inspection Report as required by NBIC Part 2, S6.5;

3) All inspection and test reports shall be maintained by the owner, user, or shipper of the transport tank in accordance with NBIC Part 2, S6.5;

4) All inspection and test reports shall be available for review by an authorized representative of the Department of Transportation; and

c) The requirements for inspections are provided for each classification of transport tanks as specified in NBIC Part 2, S6.4.6.1, Cargo Tanks, S6.4.6.2, Portable Tanks and S6.4.6.3, Ton Tanks.

S6.4.6.1 INSPECTOR DUTIES FOR CONTINUED SERVICE INSPECTION OF CARGO TANKS

a) Cargo tanks constructed in accordance with a DOT Specification that are required to be tested or inspected can not be used for transportation until the required test or inspection has been successfully completed.

File Number: NB11-0204A
Task Group Mike Wahl (PM) J. Larson, F. Johnson, R. Underwood
Subject: Part 2, Supplement 2 & Part 2, Section 9
Pages: See Below
Proposal: Several areas in the repair section for stayed areas need updating for NDE examination.

1. In Part2, Supplement 2, S2.4.4.1 (page 115) add the following text after existing paragraph. These are the same words as found in NBIC Part 3.

S2.4.4.1 NONDESTRUCTIVE EXAMINATION METHODS

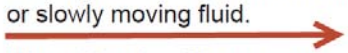
There are a variety of nondestructive examination methods that may be employed to assess the condition of historical boilers. Skill, experience, and integrity of personnel performing examinations are essential to obtaining meaningful results. Generally, some form of surface preparation will be required prior to the use of examination methods.

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

2. In Part2, Supplement 2, Section 9 (page 322) add definition for volumetric to Glossary of Terms. Definition used is from ASME Section 1 PW-11.2.

"VR" Certificate Holder — An organization in possession of a valid "VR" *Certificate of Authorization* issued by the National Board.

Velocity Distortion — The pressure decrease that occurs when fluid flows past the opening of a pressure sensing line. This is a distortion of the pressure that would be measured under the same conditions for a non or slowly moving fluid.



Water Head — The pressure adjustment that must be taken into account due to the weight of test media (in this case, water) that is 0.433 psi/ft (10 kPa/m) added (subtracted) from the gage pressure for each foot the gage is below (above) the point at which the pressure is to be measured.

Volumetric NDE- A method capable of detecting imperfections that may be located anywhere within the examined volume. Volumetric NDE is limited to radiographic (RT) and ultrasonic (UT) examination methods.

2.3.6.9 Inspection of Static Vacuum Insulated Cryogenic Vessels

a) This section covers the periodic inspection and testing of static vacuum insulated cryogenic pressure vessels used in the storage of cryogenic liquefied gases. Owner-users should inspect static cryogenic vacuum-insulated storage tanks to ensure that the equipment is in safe ~~serviceable~~ operable condition.

b) A static vacuum insulated cryogenic vessel is a vessel that is thermally insulated for use with one or more cryogenic ~~fluids~~liquid, consisting of: 1) an inner vessel holding the cryogenic ~~fluid~~liquid, 2) an outer jacket that serves as an air tight enclosure which supports the inner vessel, holds the insulation and enables the vacuum to be established, and 3) the associated piping system.

c) Check that the following conditions or safeguards are adequate prior to doing a periodic external inspection of the vessel:

1) Surface water drainage is directed away from the location of installation. Proximity of storage tank to sewer inlets shall comply with local fire jurisdictional requirements.
2) Protective measures are in place for the vessels and components from mechanical impact damage (such as barricades, safe set-back distances, poles and bars.
3) Any fire proofing for external supports is in acceptable condition. Any gas from pressure relief devices or vents is discharged to a safe point of discharge. Relief valve discharges are not aimed directly at external supports or the outer jacket wall.
4) There is sufficient ventilation to avoid the formation of explosive gas-air mixtures or an oxygen deficient/enriched atmosphere.

d) A periodic external visual inspection of the vessel and equipment should be made to ensure that the vacuum between the inner vessel and outer jacket has not been compromised. If the vessel has lost vacuum, the owner-user of the cryogenic storage vessel shall immediately investigate the cause. Any loss of vacuum should be investigated as this could affect the integrity of the vessel and support system. If the cause is due to an internal pipe failure as evidenced by vapor escaping from the vacuum relief device, the pressure should be immediately reduced to atmospheric pressure followed by emptying of all of the cryogenic liquid in a safe manner.

e) External visual inspections are possible at all accessible parts of the vessel and piping. The following inspections should be included as part of the periodic external visual inspection.

1) A functional check of essential and critical valves and their operability.
2) Leak tests under operating conditions of the vessel and piping.
3) Assessing if there have been any significant changes in the operational conditions of the installation and its surroundings.
4) Check that there is no excessive out-of-roundness or deformation of the outer jacket
5) Check all nozzles for corrosion or damage.
6) Check the vessel supports for structural damage.
7) Check that any attachments to the outer jacket are not damaged or affecting the vessel condition.
8) Verification of periodic testing and repair (or replacement) of the pressure relief device(s)
9) Check that the pressure relief device(s) are not continually venting. PRD’s may vent periodically under normal circumstances but should be reported for maintenance testing and repair if venting continually.
10) Checking the condition of the outer jacket, piping and accessories

11) Check for abnormal frosting on outer jacket surface. Under normal usage, frost and ice will develop around pipes, valves, controls and vaporizers
12) Inspect the outer skin of the outer jacket for any new or abnormal signs of excessive frosting.
13) Confirm that the duplicate ASME nameplate is attached to the outer jacket, tank leg or other permanent location affixed to the vessel.

Update Current Glossary

Cryogenic ~~**Liquid** — A refrigerated liquefied gas having a boiling point colder than -90°C (-130°F) at 101.3 kPa (14.7 psia) absolute.~~ Products stored at or below -238 °F (-150°C)

1.2- Administration

Add to end of Part 2, Section 1.2

Unless otherwise specifically required by the jurisdiction, the duties of the Inspector do not include inspection to other standards and requirements (e.g.,environmental, construction, electrical, operational, undefined industry standards, etc) for which other regulatory agencies have authority and responsibility to oversee.

Proposed New Supplement for Part 2

Inspection of Biomass Fired Boiler Installations (Section 6, Supplement 9)

S9.1 - Scope

a) This supplement provides ~~rules~~ guidelines for continued inspection of biomass fired boilers and the additional equipment utilized in these installations. In this context Biomass is intended to mean various types of ~~wood~~ wastes, or ~~wood~~ byproducts.

organic fiber

organic fiber

b) Many of the requirements of the earlier Sections of Part 2 are common to all boiler installations irrespective of the fuel being fired; therefore this supplement will address the differences that occur when solid fuels, such as Biomass, are being used. Thus the primary thrust of this section will be directed toward the inspection of the fuel handling and distribution systems, and the impact these systems may have on the pressure vessel itself.

S9.2 – Assessment of Installation

including

a) A general assessment of the complete installation shall be undertaken, ~~in terms of~~ observable results of operating and maintenance practices. ~~Indicators include the general boiler room cleanliness, for example significant quantities of fuel particles (dust) should not be apparent in the boiler room,~~ including rafters and beams.

The assessment includes the general cleanliness of the boiler room,

b) The combustion air inlet shall be free of any debris or dust particle build up, and where moveable louvered intakes exist, the actuating mechanisms shall be clean and operate freely. Corrective action is required when non-compliance is noted.

c) The flue gas venting system shall be checked for tightness, with no observable signs of leakage. Corrective action is required if leakage is noted.

d) The intakes of the various fans or blowers shall be free of fuel particle build up or signs of other debris. Corrective action in terms of cleaning is required when discrepancies are noted.

e) The fuel metering equipment and the fuel transportation system shall be free from signs of particulate or dust leakage. Corrective action in terms of cleaning and repair work is required as necessary.

f) Electrical equipment and controls shall be properly protected from the ingress of dust, by ensuring that all cover plates are properly installed and all panel doors are intact, operable and closed.

g) Verify that all guards for rotating equipment (shafts, bearings, drives) are correctly installed and fan inlet screens are in place.

h) On the boiler, generally check for signs of potential problems, including but not limited to;

- Water leaks
- Ash Leaks
- Condition of insulation and lagging.
- Casing leaks or cracks
- ~~Check a~~All safety valves ~~for~~ bypass ~~and~~ ensure the inspection plugs are capped ~~and~~ the drain lines are piped ~~away from traffic areas~~.
- Missing or misaligned pieces or parts ~~(ie~~ e.g., twisted, misaligned or bound up buck stays, missing linkage bolting~~)~~.
- Condition of support systems
- Provision of “Danger” or “Caution” signs
- Excess vibration
- Excess noise.

do not have a

remove "and" and create new bullet points for each.

to a safe point of discharge

i) Verify that the Owner/User has established function test, inspection, requirements, maintenance and testing of all controls and safety devices in accordance with the manufacturer’s recommendations. Verify that these activities are conducted at assigned intervals in accordance with written procedures, non-conformances which impact continued safe operation of the boiler are corrected and the results are properly documented. These activities shall be at a frequency recommended by the manufacturer, or frequency required by the jurisdiction. Where no frequencies are recommended, or prescribed, the activity should be conducted at least annually

S9.3 – Boiler Room Cleanliness

a) While boiler room cleanliness is of primary importance in all boiler rooms it is of particular importance in biomass fired boiler rooms. Biomass can contain fine particulate, which if allowed to leak from the transportation system into the surrounding boiler room, will eventually be drawn into fans, resulting in the possibility of combustion air systems becoming plugged.

b) Boiler rooms containing quantities of fine dusts are susceptible to fire or explosion, again emphasizing the need for high standards of cleanliness.

S9.4 – Emission Control Requirements

a) Emission control is dependent upon the fuel being fired and the emission requirements prevailing at the location of the boiler installation. As such they are a part of the initial design and installation process, and apart from ensuring that they are kept in top working condition, so that emission requirements are not violated; there is little that can be done from the inspector's point of view.

b) When Continuous Emissions Monitors (CEM's) are in use, they should be demonstrated to be functioning properly and have a current calibration sticker.

c) Delta-P pressure gauges which measure the pressure drop across the various elements of the emission control system should all be functioning correctly.

d) There should be no sign of erosion caused by entrained particulate matter, in any part of the breaching, ductwork, stack or the individual emission control elements.

e) On systems in which the emissions control system incorporates a baghouse, appropriate fire detection and suppression systems shall be incorporated and functioning properly.

2.3.6.6 INSPECTION OF WIRE WOUND PRESSURE VESSELS

(a) This section provides guidelines for inspection of wire wound pressure vessels typically designed for 10,000 psi or greater service. The scope of inspection of these vessels should include components affected by repeated opening and closing, such as the frame, yolk and cylinder inner diameter surface, or alignment of the yolk with the cylinder, lack of maintenance and a check for inoperable or bypassed safety and warning devices.

(b) These vessels consist of four parts, a wire wound cylinder, two end closures and a frame to retain the closures in the cylinder. The wire is one continuous piece and is wound in tension. On the cylinder, the wire can only carry circumferential or radial loading. The cylinder is typically not of sufficient thickness to carry axial load which requires the end closures have no threads or retaining grooves and requires a frame to retain the pressure vessel axial load imposed on the closures. The purpose for this design is to minimize weight of the containment cylinder using thinner wall materials and using external wound wire to induce a compressive preload. This design also provides increased resistance to damage from fatigue loading.

Note that some vessels may be monoblock cylinders (no winding) with wire wound frame and some vessels may be wire wound cylinder with a forged or welded plate frame (not wire wound). Use of a frame to retain the end closures removes the sharp transitions in shape (threads or grooves) associated with monoblock cylinder failures. The design of high pressure vessels is typically based on fatigue life criteria. The majority of operating wire wound vessels in North America today were fabricated under the rules of ASME BPVC Section VIII Division 3, Alternative Rules for Construction of High Pressure Vessels. Some inservice vessels may have been constructed the ASME BPVC Section VIII Division 1 or Division 2 rules, and others installed as “State Specials” that still require fatigue life analysis to determine a safe operating life. The primary failure mode is fatigue cracking. Early detection of any damage to the cylinder, closures or frame is essential to avoid catastrophic failure

High pressure design requires use of high strength materials, which have relatively low ductility. The material thickness required for reasonable fatigue life is greatly reduced by the pre-tensioned wire wound design. Typical winding design provides compression sufficient that at vessel design conditions there is no circumferential stress in the cylinder. These vessels have been used in various industrial applications, including foods and drinks processing, ceramic or refractory processing and powdered metal processing utilizing a liquid compressing fluid at ambient or slightly elevated temperature. The most frequent of these are isostatic pressing and hydrostatic extrusion. ~~Isostatic pressing can be performed at either cold temperatures, at room temperature, with liquid as the pressure medium, or hot, at temperatures of 2000 to 3300°F with gas as the pressure medium.~~ In hot isostatic presses, the vessel wall is separated from the hot space by insulation, which keeps the vessel wall operating at a low temperature of approximately 120 to 180°F.
Cold pressing is used for regular production at pressures up to 87,000 psi. Ceramic, refractory and metal processing is also performed at elevated temperature, up to 3632°F (2000°C). The “hot” processes utilize an inert gas fluid pressure up to 45,000 psi (310

Isostatic pressing can be performed at temperatures at or less than ambient with liquid as the pressure medium. When temperatures are between 2000F and 3300F, gas is used as the pressure medium.

Hydrostatic extrusion is generally performed at temperatures at or less than ambient to 1100F, with liquid as the pressure medium.

MPa). Continuous cooling is necessary for the hot process and may contribute to corrosion damage of the cylinder of closures.
~~Hydrostatic extrusion is generally performed either cold, at room temperature, or warm, at temperatures up to 1110°F, in both cases with liquid as the pressure medium.~~
Hydrostatic extrusion is used for regular production at pressures up to 200,000 psi. ~~Both~~ cold and hot processes are commonly found in research facilities and in universities.

(c) Record keeping

(1) Since these vessels have a finite fatigue life, it is essential a record be maintained of each operating cycle, recording both temperature and pressure. Deviation beyond design limits is cause for suspending operation and reevaluation of remaining fatigue life. Vessels having no operating record should be inspected and a fracture mechanics evaluation with a fatigue analysis test be performed to establish remaining life before resuming operation.

(2) Operating data should be recorded and include the following whenever the vessel is operating:

a. Number of cycles
b. Maximum pressure
c. Maximum temperature

add:
d. any unusual conditions
e. Duration of the cycle
f. Date & time of cycle start

(d) ~~Any unusual conditions (d)~~ Any damage to the cylinder or closures can lead to premature failure. Frequent visual inspection should be made of internal and external surfaces of the cylinder, frame and closures. A thorough examination should be completed if any visually apparent damage is identified or if any excursion beyond design temperature or pressure occurs.

In addition, surfaces of the cylinder and closures should be examined by dye penetrant or magnetic particle method at intervals based on vessel remaining life. Closures may require ultrasonic examination of passageways.

Following is an example of what the results of such a study might reveal as allowable cycles for a particular wire wound vessel:

Columns	> 10^6 Cycles	"Columns" are beams on either side of frame, between the yokes.
Yokes	> 10^6 Cycles	"Yokes" are the circular ends of the frame.
Wires of frames	> 10^6Cycles	"Wires" place frame in compression
Cylinder	100 X 10^3 cycles	
Wires of Cylinder	60 X 10^3 cycles	"Wires" place cylinder in compression.
Closures	30 X 10^3 cycles	All connections to the vessel are through the closures. These passageways create stress raisers, as do grooves for sealing system.

The vessel design life in this example is thus limited by the closure. The calculated design life is 30,000 cycles at design pressure and temperature.

An acceptable factor of safety for vessel fatigue inspection interval varies between 0.25 and 0.5 of the remaining design life. The inspection interval for the above example is therefore ~~10,000 to 20,000~~ 7,500 to 15,000 cycles, but should not exceed five years.

In addition to scope of frequent inspection, the fatigue inspection should include measurement of the cylinder inside diameter and frame inside length to detect reduced tension in the wire windings. Note that monoblock cylinders and plate frames require additional inspection due to differing construction.

If a crack or flaw is detected during any inspection, an immediate evaluation, repair and study of impact on remaining fatigue life should be completed by a National Board authorized repair agency. Using the results of this study, and application of safety factor 0.25 (due to known damage), the number of cycles of operation to the next fatigue inspection is established.

As part of the frequent inspection, the following items should be reviewed:

(1) Verify no change in the process, such as the processing fluid, that might adversely impact vessel integrity.

(2) Review the vessel manufacturer's inspection recommendations for vessel, closures and frame. If manufacturer's recommendations are not available, obtain recommendations from a recognized wire wound vessel service provider.

(3) Verify any repair to pressure retaining items has been completed by National Board authorized service provider having wire wound vessel expertise.

(4) Verify overpressure protection with appropriate set pressure and capacity is provided. Rupture discs are commonly used for pressures exceeding 14,500 psi (100 MPa) to avoid valve seat leakage. Overpressure protection devices are frequently replaced to avoid premature operation.

(e) Additional Inspection Criteria

(1) If there are no manufacturer's recommendations available for the vessel, the following are additional recommended inspections that should be conducted to ensure vessel integrity and safety

a. Conduct annual visual and dimensional vessel inspections with liquid penetrant examination of maximum stressed areas to ensure that the surfaces are free of defects. Conduct ultrasonic examination of the vessel after every 25% of the design cycle life or every five years, whichever comes first, to detect subsurface cracks. Special attention Should be given to the roots of threads and closures using threaded head retention construction. Other geometric discontinuities that are inherent in the design or irregularities resulting from localized corrosion, erosion, or mechanical damage should be carefully examined. This is particularly important for units of monoblock construction.

If pitting, cracks, corrosion or other defects are found during an inspection, an evaluation using fracture mechanics techniques shall be performed.

b. The closure mechanism of the vessel end-closure is opened and closed frequently during operation. It should be closely inspected for freedom of movement and proper contact with its locking elements. Wire wound vessels must have yoke-type closures so the yoke frame will need to be closely inspected on a regular basis

c. ~~Should pitting, cracks, corrosion, or other defects are found during scheduled inspection; verify that an evaluation using fracture mechanics techniques is performed.~~ This is to determine MAWP, cyclic life and extent of NDE frequency based on crack growth rate.

(2) Gages, Safety Devices, and Controls

a. Verify that the vessel is provided control and monitoring of the pressure, temperature, electrical system, fluid flow, liquid levels, and all variables that are essential for the safe operation of the system. If the vessel is automatically controlled, manual override should be available. Also, safety interlocks should be provided on the vessel closure to prevent vessel pressurization if the vessel closure is not complete and locked.

b. Verify that all safety device isolation valves are locked open if used.

c. Verify appropriate pressure relief device is installed with relief setpoint at ~~low a pressure as possible~~, consistent with the normal operating pressure but in no case higher than the design operating pressure of the vessel. Rupture discs are normally considered more suitable for these types of applications since pressure relief devices operating at pressures above 14500 psi may tend to leak by their seat.

the lowest pressure possible,

spring loaded

d. Verify that pressure and temperature of the vessel coolant and vessel wall is controlled and monitored. Interlock devices associated with these monitoring devices that will deenergize or depressurize the vessel are strongly recommended due to the potential significant damage that can be caused by release of energy in the event of overpressurization due to excess pressure or temperature in the vessel.

e. Verify audible and visual alarms are installed to indicate unsafe conditions.

and operable

Comment: Metric SI conversion factors to be used throughout this document. (Administrative)

PART 2, SECTION 5
INSPECTION — STAMPING, DOCUMENTATION, AND FORMS

5.1 SCOPE

This section provides guidelines and requirements for stamping and documentation (forms) for inservice inspections of PRIs. This section also describes evaluation of inspection results and assessment methodologies.

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 instruct the owner or user to have the nameplate or 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 data or replace nameplates shall be made to the Jurisdiction in which the nameplate or stamping is reapplied. Application ~~must~~ shall be made on the *Replacement of Stamped Data Form*, NB-136 (see NBIC Part 2, 5.3.2). Proof of traceability to the original nameplate or 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 ~~.~~ for approval prior to replacing a nameplate or re-applying a stamping. ~~The completed Form NB-136 (see 5.3.2) shall be submitted to the National Board.~~ The owner or user shall retain all documentation provided for traceability with the completed form NB-136 for as long as the pressure-retaining item is in their ownership or use. If the pressure-retaining item is sold, Form NB-136 along with the supporting documentation shall be provided to the new owner. The manufacturer of the pressure-retaining item, if available, ~~should~~shall be contacted prior to replacing a nameplate or stamped data in order to verify applicable code requirements.

b) When there is no Jurisdiction, ~~the~~ documentation used for traceability shall be ~~accepted~~ verified and the replacement of the nameplate or stamped data shall be authorized and witnessed by a National Board Commissioned Inspector. ~~The completed Form NB-136 shall be submitted to the National Board.~~

5.2.2 REPLACEMENT OF NAMEPLATE OR STAMPED DATA

a) The re-stamping or replacement of data shall be witnessed 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 or stamped data shall be clearly marked “replacement.”

5.2.3 REPORTING

The completed Form NB-136 with a facsimile of the replacement stamping or nameplate as applied and appropriate signatures shall be filed with the Jurisdiction, if applicable, and the National Board by the owner or user ~~(if required) and the National Board~~ or by the “R” Stamp Holder if work was performed. ~~bearing a facsimile of the replacement stamping or nameplate, as applied, and shall also bear the signature of the “R” Stamp holder that performed the replacement and the National Board Commissioned Inspector who authorized and witnessed the replacement.~~

5.2.4 REPLACEMENT OF DUPLICATE NAMEPLATES

Replacement or re-attachment of duplicate nameplates is exempt from meeting the requirements above provided the information on the nameplate is identical to the original data existing on the pressure-retaining item. The duplicate nameplate shall be marked duplicate. The jurisdiction where the pressure-retaining item is located and the original manufacturer of the item ~~should~~shall be contacted for additional guidance and direction. When the Code symbol stamp cannot be applied, Form NB-136 shall be completed, signed by a National Board Commissioned Inspector, retained and a copy submitted to the National Board by the owner or user as described in 5.2.1 a).

5.3 NATIONAL BOARD INSPECTION FORMS

5.3.1 SCOPE

~~The following f~~Forms specified in 5.3.2 may be used for documenting specific requirements as indicated on the top of each form.

Note: Jurisdictions may have adopted other forms for the same purpose and may not accept these forms.

NB14-1001, NB15-0204 & NB15-2105

REPLACEMENT OF STAMPED DATA FORM, NB-136

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

Submitted to:

(name of jurisdiction)

(address)

(telephone no.)

Submitted by:

(name of owner, user, 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.
10. If nameplate is lost or illegible, traceability documentation, verified by the Inspector shall be attached to this report.

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).

"R" Certificate Holder/Owner User

~~"R" Certificate Holder's~~ Name: Number

Signature Date

Verification of Traceability (Name of inspector) NB Commission

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

Signature (chief inspector or authorized representative) Date

Jurisdiction (if available) or NB Commission no.

This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Ave., Columbus, OH 43229 NB-136 Rev.7

"FOR COMMITTEE USE ONLY"

NB14-1001, NB15-0204 & NB15-2105

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

The following is a true facsimile of the item's replacement stamping or 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*.

"R" Certificate Holder/Owner User

~~"R" Certificate Holder~~ _____ Number _____

Signature _____ Date _____
(authorized representative)

Witnessed by _____ Employer _____
(name of inspector)

Signature _____ Date _____ NB Commission _____
(inspector)

This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Ave., Columbus, OH 43229 NB-136 Rev.7(Back)

NB15-0801 & NB15-0901
(PM) Mooney, Newton, Welch, Barker

Commenter Name: **Kenneth A. Stoller - American Insurance Association (AIA)**
Commenter Address: **2101 L Street NW, Suite 400**
Washington, DC 20037
Commenter Phone: **202-828-7167**
Commenter Fax: **202-495-7866**
Commenter Email: **kstoller@aiadc.org**

Section/Subsection Referenced: **Supplement 10, Inspection of Liquid Carbon Dioxide Storage Vessels**
Comment/Recommendation: *Proposed Solution:* ☐ New Text ☒ Revise Text ☒ Delete Text

AIA believes that several aspects of the proposed requirements are either undefined or otherwise beyond the normal scope and training of National Board Commissioned Inspectors. Imposing these requirements on Special Inspectors may also place them in the untenable position of assuming liability beyond the limits of the insurance policies under which they perform inspections. Items of concern include the failure to define the terms "sufficient clearance" (S10.2b), "safely supported" (S10.2d), "guarded (S10.2f); and "permanent" (S10.3a). We recommend either defining or deleting these terms. Furthermore, Commissioned Inspectors are not qualified to (i) determine whether a CO2 detector is set to alarm at any particular concentration (S10.5); (ii) verify the posting of warning signs and determine the setpoint of any alarms (S10.6); or (iii) determine the length of safety relief/vent lines or verify that the materials selected for valves, piping, tubing, hoses and fittings used in the LCDSV system meet certain requirements. We recommend deleting these sections.

SUPPLEMENT 10 INSPECTION OF LIQUID CARBON DIOXIDE STORAGE VESSELS

S10.1 SCOPE

This supplement provides ~~requirements~~ guidelines for owners or users ~~when inspecting~~for the inspection of Liquid Carbon Dioxide Storage Vessels (LCDSVs), fill boxes, fill lines and pressure relief discharge/vent circuits used for carbonated beverage systems, swimming pool pH control systems and other fill in place systems storing liquid CO_2.

S10.2 GENERAL REQUIREMENTS (ENCLOSED AND UNENCLOSED AREAS)

The ~~Inspector~~ inspection ~~shall~~ should verify that LCDSVs are:

a) ~~are~~ not ~~be~~ located within 10 feet (3050 mm) of elevators, unprotected platform ledges or other areas where falling would result in dropping distances exceeding half the container height;
b) ~~are~~ installed with ~~sufficient~~ clearance to satisfactorily allow for~~for~~ filling, operation, maintenance, inspection and replacement of the vessel parts or appurtenances;
c) ~~are~~ not ~~installed~~ located on roofs;
d) ~~are safely~~ adequately supported ~~as~~ to prevent the vessel from tipping or falling, and to meet seismic requirements as required by design~~as needed.~~;
e) ~~are~~ not located within 36 in. (915 mm) of electrical panels; and
f) located outdoors in areas in the vicinity of vehicular traffic are protected with barriers designed to ~~guarded to~~ prevent accidental impact by vehicles.

S10.3 ENCLOSED AREA LCDSV INSTALLATIONS

The ~~Inspector~~ inspection ~~shall~~ should verify that:

a) ~~Permanent~~ LCDSV installations that are not periodically removed with remote fill connections:

1) Are equipped with a gas detection system installed in accordance with ~~NBIC Part 2,~~paragraph S10.5 of this supplement;

2) Have signage posted in accordance with ~~NBIC Part 2,~~paragraph S10.6 of this supplement; and

3) Are equipped with fill boxes, fill lines and safety relief/vent valve circuits installed in accordance with ~~NBIC Part 2, S10.4.~~paragraph S10.4 of this supplement.

b) Portable LCDSV installations with no permanent remote fill connection:

Warning: LCDSVs shall not be filled indoors or in enclosed areas under any circumstances. Tanks must always be moved to the outside to an unenclosed, free airflow area for filling.

1) Are equipped with a gas detection system installed in accordance with paragraph S10.5 of this supplement~~NBIC Part 2, S10.5~~;

2) Have signage posted in accordance with paragraph S10.6 of this supplement~~NBIC Part 2, S10.6~~.

3) Have a safety relief/vent valve circuit connected at all times except when the tank is being removed for filling. Connections may be fitted with quick disconnect fittings meeting the requirements of paragraph S10.4 of this supplement~~NBIC Part 2, S10.4~~.

4) Are provided with a pathway that provides a smooth rolling surface to the outdoor, unenclosed fill area. There shall not be any stairs or other than minimal inclines in the pathway.

S10.4 FILL BOX LOCATION /SAFETY RELIEF/VENT VALVE CIRCUIT TERMINATION

The ~~Inspector~~ inspection ~~shall~~ should verify that fill boxes and/or vent valve terminations are installed above grade, outdoors in an unenclosed, free airflow area, and that the fill connection is located so not to impede means of egress or the operation of sidewalk cellar entrance doors, including during the delivery process and that they are:

a) At least three (3) feet (915 mm) from any door or operable windows;*

b) At least three (3) feet (915 mm) above grade;*

c) Not located within ten (10) feet (3050 mm) from side to side at the same level or below, from any air intakes;*

d) Not located within ten (10) feet (3050 mm) from stair wells that go below grade.*

* Note: Many systems installed prior to 1/1/2014 do not meet the above requirements and the local Jurisdiction should be consulted for guidance.

S10.5 GAS DETECTION SYSTEMS

Rooms or areas where carbon dioxide storage vessel(s) are located indoors or in enclosed or below grade outdoor locations shall be provided with a gas detection and alarm system for general area monitoring that is capable of detecting and notifying building occupants of a CO_2 gas release. Alarms will be designed to activate a low level pre-alarm at 1.5% concentration of CO_2 and a full high alarm at 3% concentration of CO_2 which is the NIOSH & ACGIH 15 minute Short Term Exposure Limit for CO_2. These systems are not designed for employee personal exposure monitoring. Gas detection systems shall be installed and tested in accordance with manufactures installation instructions and the following requirements:

a) The ~~Inspector~~ inspection ~~shall~~ should verify that the gas detection system and audible alarm is operational and tested in accordance with manufacturer's guidelines.

b) The ~~Inspector~~ inspection ~~shall~~ should verify that audible alarms are placed at the entrance(s) to the room or area where the carbon dioxide storage vessel and/ or fill box is located to notify anyone who might try to enter the area of a potential problem.

S10.6 SIGNAGE

The ~~Inspector~~ inspection ~~shall~~ should verify that warning signs are posted at the entrance to the building, room, enclosure, or enclosed area where the container is located. The warning sign shall be at least 8 in (200mm) wide and 6 in. (150mm) high. The wording shall be concise and easy to read and the upper portion of the sign must be orange as shown in figure NBIC Part 2, Figure S10.6. The size of the lettering must be as large as possible for the intended viewing distance and in accordance with jurisdictional requirements. When no jurisdictional requirements exist, the minimum letter height shall be in accordance with NEMA American National Standard for Environmental and Facility Safety Signs (ANSI Z535.2). The warning signs shall be as shown in figure S10.6.

Figure S10.6

Additional instructional signage shall be posted outside of the area where the container is located and such signage shall contain at minimum the following information:

a) Carbon dioxide monitors for general area monitoring (not employee personal exposure monitoring) are provided in
this area. These monitors are set to alarm at 5,000 ppm(1.5% concentration) for the low level alarm and at 30,000 ppm (3% concentration) for high level alarm.

b) Low Level Alarm (5,000 ppm) – Provide appropriate cross ventilation to the area. Personnel may enter area for short periods of time (not to exceed 15 minutes at a time) in order to identify and repair potential leaks.

c) High Level Alarm (30,000 ppm) – Personnel should evacuate the area and nobody should enter the affected area without proper self-contained breathing apparatus until the area is adequately ventilated and the concentration of CO_2 is reduced below the high alarm limit.

S10.7 VALVES, PIPING, TUBING AND FITTINGS

a) Materials – The ~~Inspector~~ inspection should ~~shall~~ verify that the materials selected for valves, piping, tubing, hoses and fittings used in the LCDSV system meet following requirements:

1) Components shall be rated for the operational temperatures and pressures encountered in the applicable circuit of the system.

2) All valves and fittings used on the LCDSV shall be rated for the maximum allowable working pressure(MAWP) stamped on the tank.

3) All piping, hoses and tubing used in the LCDSV system shall be rated for the working pressure of the applicable circuit in the system and have a burst pressure rating of at least four times the MAWP of the piping, hose or tubing.

b) Relief Valves – The ~~Inspector shall~~inspection should verify that each LCDSV shall have at least one ASME/NB stamped & certified relief valve with a pressure setting at or below the MAWP of the tank. The relief valve shall be suitable for the temperatures and flows experienced during relief valve operation. The minimum relief valve capacity shall be designated by the manufacturer. Additional relief valves that do not require ASME stamps may be added per Compressed Gas Association pamphlet, CGA S-1.3 Pressure Relief Device Standards Part 3, Stationary Storage Containers for Compressed Gases, recommendations. Discharge lines from the relief valves shall be sized in accordance with NBIC Part 2, Tables S10-a and S10-b.

Note: Due to the design of the LCDSV the discharge line may be smaller in diameter than the relief valve outlet size.
Caution: Company's and or individuals filling or refilling LCDSV's shall be responsible for utilizing fill equipment that is acceptable to the manufacturer to prevent over pressurization of the vessel.

c) Isolation Valves – The ~~Inspector shall~~inspection should verify that each LCDSV shall have an isolation valve installed on the fill line and tank discharge, or gas supply line in accordance with the following requirements:

1) Isolation valves shall be located on the tank or at an accessible point as near to the storage tank a possible.
2) All valves shall be designed or marked to indicate clearly whether they are open or closed.
3) All valves shall be capable of being locked or tagged in the closed position for servicing.
4) Gas supply and liquid CO_2 fill valves shall be clearly marked for easy identification.

d) Safety Relief/Vent Lines – The ~~Inspector~~inspection, where possible, ~~shall~~ should verify the integrity of the pressure relief/vent line from the pressure relief valve to outside vent line discharge fitting. All connections shall be securely fastened to the LCDSV. The minimum size and length of the lines shall be in accordance with NBIC Part 2, Tables S2 10-a and S2 10-b. Fittings or other connections may result in a localized reduction in diameter have been factored into the lengths given by the NBIC Part 2, Tables S2 10-a and S2 10-b.

Table S10-a Minimum LCDSV System Pressure Relief/Vent Line Requirements (Metallic)

Tank Size
(Pounds)
Fire Flow Rate
Requirements
(Pounds per Minute)
Maximum Length of
3/8 inch ID Nominal
Metallic Tube Allowed
Maximum Length of 1/2
inch ID Nominal
Metallic Tube
Allowed
Less than 500 2.60 maximum 80 feet 100 feet
500-750 3.85 maximum 55 feet 100 feet
Over 750-1000 5.51 maximum 18 feet 100 feet

Table S10-b Minimum LCDSV System Pressure Relief/Vent Line Requirements (Plastic/Polymer)

Tank Size
(Pounds)
Fire Flow Rate
Requirements (Pounds
per Minute)
Maximum Length of
3/8 inch ID
Plastic/Polymer

Materials Tube Allowed
Maximum Length of ½
inch ID Plastic/Polymer
Materials
Tube Allowed
Less than 500 2.60 maximum 100 feet 100 feet
500-750 3.85 maximum 100 feet 100 feet
Over 750-1000 5.51 maximum N/A see ½ inch 100 feet

Table S10-a Metric Minimum LCDSV System Pressure Relief /Vent Line Requirements (Metallic)

Tank Size
(Kilograms)
Fire Flow Rate
Requirements
(Kilograms per Minute)
Maximum Length of
10mm ID Nominal
Metallic Tube Allowed
Maximum Length of
13mm ID Nominal
Metallic Tube Allowed
Less than 227 1.8 maximum 24 m 30.5 m
227-340 1.75 maximum 17 m 30.5 m
340-454 2.50 maximum 5.5 m 30.5 m

Table S10-b Metric Minimum LCDSV System Pressure Relief/Vent Line Requirements (Plastic/Polymer)

Tank size
(kg)
Fire Flow Rate (kg per
Minute)
Maximum Length of 10
mm ID Nominal Metallic
Tube Allowed
Maximum Length of 10
mm ID Plastic/Polymer
Materials Tube Allowed
Less than 227 1.18 maximum 30.5 m 30.5 m
227-340 1.75 maximum 30.5 m 30.5 m
Over 340-454 2.5 maximum N/A see 13 mm 30.5 m
Note: Due to the design of the LCDSV the discharge line may be smaller in diameter than the pressure relief valve outlet size but shall not be smaller than that shown in tables NBIC Part 2, S10-a and S10-b.

Include the following text in the Introduction under the heading “Stamping”

ASME Code “Stamping” referenced throughout the NBIC includes the ASME Boiler and Pressure Vessel Code Symbol Stamps used for conformity assessment prior to the 2010 edition/2011 addendum and the equivalent ASME Certification Mark with Designator required to meet the later editions of the ASME Boiler and Pressure Vessel Code Sections. When other construction codes or standards are utilized for repairs or alterations, stamping shall mean the identification symbol stamp required by that code or standard to indicate conformity assessment.

NB15-2103

NFPA 58 contains the following language regarding conversion of tanks for LP-Gas fuel service from ammonia service:

5.2.1.5 Except for containers used in cargo tank vehicle service, ASME containers of 3000 gal (11.4 m3) water capacity or less used to store anhydrous ammonia shall not be converted to LP-Gas fuel service.

Therefore, the following are proposed edits (**in bold red**) to S9.4 and S7.8.6 address NB15-2103. No edits required to S7.9:

S9.4 SOME EXAMPLES FOR CHANGE OF SERVICE

Table S9.4 lists examples of what constitutes a change in service and some factors to consider. Note: This list is not all inclusive. There may be other service changes not mentioned. The listing of "Factors to Consider" is also not all inclusive. There may be other elements that can influence the safe and reliable operation of the pressure retaining item. The owner shall check with the Jurisdiction where the pressure retaining item is to operate in the new environment, and review local building codes, laws, and regulations for additional requirements or prohibitions against a change of service.

TABLE S9.4

EXAMPLES OF CHANGE OF SERVICE CONDITIONS

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
• NFPA 58 should be consulted Ammonia to LP gas
• NFPA-58 **5.2** should be consulted **for restrictions**~~. Refer 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**, S7.8.6, S7.9**

LP gas service: from above ground to underground

• Requires alterations (additional

S7.8.6 ANHYDROUS AMMONIA SERVICE

ASME containers of 3000 gal (11.4 m3) water capacity or less used to store anhydrous ammonia, except for containers used in cargo tank vehicle service, shall not be converted to LP-Gas service.

NB15-2103

Cargo tank containers less than 3000 gal (11.4 m3) water capacity to be converted from ammonia to LP-gas service shall be wet-fluorescent magnetic particle tested (WFMT) on all internal surfaces (see NBIC Part 2, 2.3.6.4).~~Containers that have been previously used in anhydrous ammonia service shall not be converted to LPG service.~~

~~Any b~~Blue coloring of the brass valves ~~indicates~~ is one indication that the container has been in anhydrous ammonia service.

S7.9 ASME LPG CONTAINERS LESS THAN 2000 GALLONS BEING REFURBISHED BY A COMMERCIAL SOURCE.

Commercially refurbished containers are used containers that are temporarily taken out of service for repair and or renewal and sent to a company which specializes in this type of work. Because the history of some of these containers is unknown, special attention shall be given to inspection and repair before returning any of these containers back to service. ASME LPG containers less than 2,000 gal. (7,570 l) may be refurbished subject to the following conditions:

a) A complete external inspection shall be completed under the guidelines of this supplement. If any defects are found, as defined in S7.8.1 through S7.8.5, the defect shall be repaired under NBIC Part 3,Repairs and Alterations, by qualified personnel or permanently removed from service;

b) Containers **of this size** that have been previously used in anhydrous ammonia service shall not be converted to LPG service. See NBIC Part 2, S7.8.6;

NB15-2201

Brad,

The changes to Supplement 10 were approved by the FRP Subgroup during its meeting in Tampa. Please ballot the Inspection Subcommittee.

Note the proposed changes are highlighted in yellow, with additions in blue and deletions indicated by ~~strikethrough~~.

Supplement 10 as shown below:
10.1
a) Metallic vessel with a hoop Fiber Reinforced Plastic (FRP) wrap over the ~~straight shell~~ cylindrical part of the vessel (both load sharing).

S10.3 INSPECTOR QUALIFICATIONS

a) The inspector referenced in this supplement is a National Board Commissioned Inspector ~~complying with the requirements of NB-263~~.

For b) see Attached

~~b) 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 NBIC Part 2 Para. S4.2 and S4.5~~.

b) The R Certificate holder's inspector shall be familiar with vessel construction and qualified by training and experience as described in NBIC Part 2 S4.5 to conduct such inspections. The inspector shall 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 shall have basic knowledge of the vessel material types and properties. Refer to Part 2 Para. S4.2 and S4.5.

~~c) The acoustic emission technician conducting the examination required per S10.5(c) and in accordance with S10.10 shall be certifi ed 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~~

c) moved to S10.10.2

NB15-2201

~~with measuring Cc and Cf in composites and identifying wave modes~~.

S10.6
b) The visual examination of the vessel requires that the identity of the vessel ~~must~~ shall be verified. This ~~should~~ shall include the construction code (ASME) to which the vessel was constructed, vessel serial number, maximum allowable 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~~ shall be noted.

S10.8
a) Vessel Service Life
Vessels have been designed and manufactured for a limited lifetime; this is indicated on the vessel marking. This marking ~~should~~ shall first be checked to ensure that such vessels are within their designated service lifetime.
b) Identification of External Damage
The external surface ~~should~~ shall be inspected for damage to the laminate. Damage is classified into two levels as shown in Table S10.7-a or Table S10.7-b of this supplement. The acceptance/rejection criteria shown in Table S10.7-a or Table S10.7-b of this supplement shall 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 shall be noted. Vessel support structures and attachments ~~should~~ shall be examined for damage such as cracks, deformation, or structural failure.

S10.9
a) Requirements for Internal Visual examination
Internal visual examination 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 examination of the tanks ~~should~~ shall only be carried out when:

NB15-2201

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~~ shall require an internal visual examination.
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 examination in this case is limited to examination of the threads and sealing surface. When an internal visual examination is conducted, the following procedures ~~should~~ shall be followed.
b) Identification of Internal Damage
1) Vessels with Metallic Liners
For vessels with metallic liners, the objective of the internal visual examination is primarily to detect the presence of any corrosion or corrosion cracks. The internal surface of the vessel shall be examined with adequate illumination to identify any degradation or defects present. Any foreign matter or corrosion products ~~should~~ shall be removed from the interior of the vessel to facilitate inspection. Any chemical solutions used in the interior of the vessel ~~should~~ shall be selected to ensure that they do not adversely affect the liner or composite overwrap materials. After cleaning the vessel ~~should~~ shall be thoroughly dried before it is examined. All interior surfaces of the vessel ~~should~~ shall be examined for any color differences, stains, wetness, roughness, or cracks. The location of any degradation ~~should~~ shall be noted.
Any vessel showing significant internal corrosion, dents or cracks ~~should~~ shall 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~~ shall be examined with adequate illumination to identify any degradation or defects present. Any foreign matter or corrosion products ~~should~~ shall be removed from the interior
of the vessel to facilitate examination. Chemical solutions used in the interior of the vessel ~~should~~ shall be selected to ensure they do not adversely affect the liner or composite overwrap materials. After cleaning the vessel ~~should~~ shall be thoroughly dried before it is examined.

The Inspector ~~should~~ shall look for cracks, porosity, indentations, exposed fibers, blisters, and any other

NB15-2201

indication of degradation of the liner and/or laminate. Deterioration of the liner may include softening of the matrix or exposed fibers.

S10.10 ACOUSTIC EMISSION EXAMINATION

Add

S10.10.2 AE Technician Requirements

The acoustic emission technician conducting the examination required per S10.10.1 and in accordance with S10.10 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.

Renumber all following items as needed

10.10.~~2~~ 3

The E and F waves ~~must~~ shall 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.

10.10.3

Examination of the waveforms event by event ~~must~~ shall always be possible and the waveforms for each event ~~must~~ shall 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.

b) 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 in. (13 mm) for the active part of the sensor face. The aperture effect ~~must~~ shall be taken into account. Sensor sensitivity shall be at least 0.1 V/nm.

Current 10.10.3 c)

The impact setup, an example of which is shown in Figure S10.10.3.a), shall be arranged as follows. The steel ball shall be ½ inch (13 mm) in diameter. The steel ball is a type typically used in machine shops for measuring taper and is commercially available. The ball shall be made of chrome steel

alloy hardened to R/C 63, ground and lapped to a surface finish of 1.5 micro-inch (0.0000381 mm), within 0.0001 inch (0.0025 mm) of actual size and sphericity within 0.000025 inch (0.00064 mm).

S10.3 INSPECTOR QUALIFICATIONS

b) The Inspector shall be familiar with FRP vessel construction and qualified by training and experience to conduct such inspections. The Inspector ~~should~~ shall 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~~ shall have basic knowledge of the vessel material types and properties. Refer to NBIC Part 2, S4.2 and S4.5.

NB15-2304

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

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

ACCREDITATION PROGRAMS

The National Board administers and accredits three specific repair programs[1] as shown below:

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

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

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

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

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

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

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

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

CERTIFICATES OF AUTHORIZATION FOR ACCREDITATION PROGRAMS

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

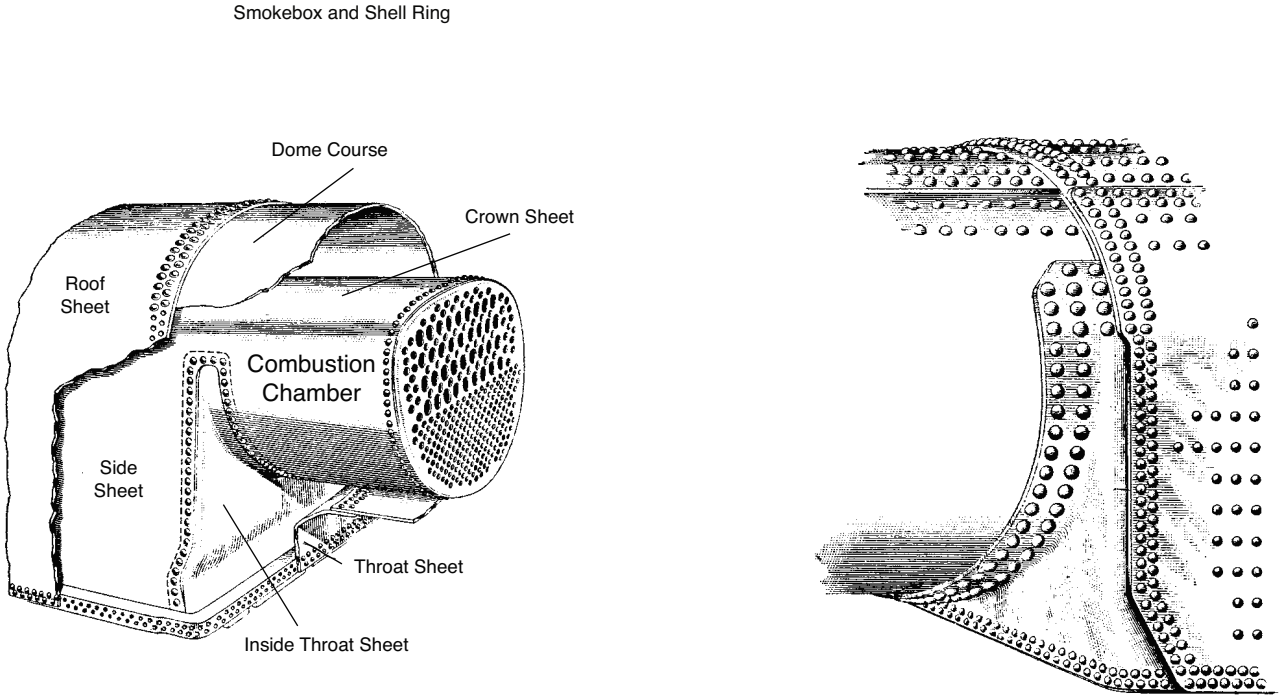
Certificate of Authorization scope, issuance, and revisions for National Board accreditation programs are specified in the applicable National Board procedures. When the quality system requirements of the appropriate accreditation program have been met, a Certificate of Authorization and appropriate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

Some

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

NB15-2304

FIGURE S1.1-b
ARRANGEMENT OF FIREBOX SHEETS (STAYBOLTS DELETED FOR CLARITY)



S1.2 SPECIAL JURISDICTIONAL REQUIREMENTS

Many Jurisdictions have special requirements for locomotive boilers. Such requirements shall be considered in addition to those in this supplement.

S1.3 FEDERAL RAILROAD ADMINISTRATION (FRA)

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

S1.4 LOCOMOTIVE FIRETUBE BOILER INSPECTION

S1.4.1 INSPECTION METHODS

a) Plate thickness and depth of corrosion may be determined by use of the ultrasonic thickness testing process.

2 Steam locomotive inspection and maintenance standards, which are now codified at 49CFR Part 230, may be obtained at the FRA Website.

acceptable for use. The use of malleable iron class 150 is not recommended. Forged threaded fittings per ASME B16.11 classes 2,000-6,000 are acceptable for use;

d) The blowdown line shall be piped to a safe point of discharge during the time the boiler is operating;

e) Piping shall be properly supported;

f) Valves shall be used in the manner for which they were designed, and shall be used within the specified pressure-temperature ratings. Valves shall be rated at or above the pressure setting of the boiler safety valve, denoted by the general or primary pressure class identification on the valve body and/or by the initials "WSP" or "S" to indicate working steam pressure or steam rating. Valves in cold-water service may be designated by the initials "WOG" to indicate water, oil, or gas rating and/or by the pressure class identification on the valve body; and

g) The boiler shall be equipped with two means of supplying feedwater while the boiler is under pressure.

S2.9.1 PIPING, FITTINGS, AND VALVE REPLACEMENTS

The installation date should be stamped or stenciled on the replaced boiler piping. Alternatively, the installation date may be documented in permanent boiler records, such as the operator log book.

S2.10 MAXIMUM ALLOWABLE WORKING PRESSURE (MAWP)

The MAWP of a boiler shall be determined by computing the strength of each boiler component. The computed strength of the weakest component using the factor of safety allowed by these rules shall determine the MAWP.

Note: The rules of ASME Section I 1971 Edition, Part "PR" and "PFT" may be used for determining specific requirements of design and construction of boilers and parts fabricated by riveting.[3]

S2.10.1 STRENGTH

a) In calculating the MAWP, when the tensile strength of the steel or wrought iron is known, that value shall be used. When the tensile strength of the steel or wrought iron is not known, the values to be used are 55,000 psi (379 MPa) for steel and 45,000 psi (310 MPa) for wrought iron. Original steel stamp marks, original material certifications, or current laboratory tests are acceptable sources for verification of tensile strength. Catalogs and advertising literature are not acceptable sources for tensile strength values.

b) In computing the ultimate strength of rivets in shear, the following values shall be used:

1)	Iron rivets in single shear	38,000 psi (262 MPa)
2)	Iron rivets in double shear	76,000 psi (524 MPa)
3)	Steel rivets in single shear	44,000 psi (303 MPa)
4)	Steel rivets in double shear	88,000 psi (607 MPa)

c) The resistance to crushing of mild steel shall be taken as 95,000 psi (655 MPa) unless otherwise known.

d) S = TS/FS. See definitions of nomenclature in NBIC Part 2,S2.10.6.

3 Copies of ASME Section I 1971 Edition Part "PR" and "PFT" referenced section may be obtained by contacting the National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Ave., Columbus, OH 43229.

NB15-2304

e) Remove gage glass and valves, and inspect these connections for lime deposits and clean if necessary. This should be done once a year; more often if conditions warrant it.

f) After inspection, replace glass (clean if necessary). Also inspect gage glass sealing washers and replace if necessary.

g) During cold weather, the historical boiler should be moved into a heated area and the boiler allowed to warm up in the air for several days until it is the same temperature as the air.

h) The initial fire-up should be done slowly to allow even heating of the boiler.

i) Before movement, the cylinder(s) should be warmed up by allowing a small quantity of steam to blow through them and out the cylinder cocks and exhaust passage(s). This is necessary to reduce the stress in the casting from thermal expansion of the metal.

j) Steam should be discharged through the cylinder cocks for several minutes to aid removal of any solvent, debris, or rust that may have formed in the steam pipes, cylinder, valve chest, and dry pipe.

k) All appliances should be tested under steam pressure before the historical boiler is moved or put under load.

S2.14 SAFETY PROCEDURES[4] 2

This chapter of text covers procedures in certain situations or emergencies that may occur.

S2.14.1 EXPERIENCE

a) Reading check lists and procedures can be of some value to get you thinking about what you are doing, but nothing can replace the experience gained by working beside conscientious and knowledgeable engineers. Ask questions, observe, read, listen, study, and think.

b) Safe operations depend upon thorough attention to detailed routines. Having procedures thought out, planned, and practiced before they are needed could minimize accidents and improve public safety. Know your abilities as well as the limitations of the machine that you are operating. In most cases knowing and keeping your machine in top operating condition can prevent most emergency situations from occurring. However, sometimes problems or situations beyond your control do occur. In any situation the first rule to remember is to keep a cool head. Haste and panic can never solve any emergency.

c) Don't be afraid to ask for help or advice. A lot of shows and public demonstrations have a designated individual in the area to ensure safe operation and assistance should a problem arise.

S2.14.2 STOPPING ENGINE IN AN EMERGENCY

a) Know how to stop the engine suddenly. For example, if someone or something runs out in front of the engine or some problem happens with whatever it is belted up to:

1) Close throttle.

2) Reverse valve quadrant position.

3) Open throttle for a moment (this will quickly stop your engine).

4) Close throttle.

NB15-2304

SUPPLEMENT 5
INSPECTION OF YANKEE DRYERS (ROTATING CAST-IRON PRESSURE VESSELS) WITH FINISHED SHELL OUTER SURFACES

S5.1 SCOPE

a) This supplement describes guidelines for the inservice inspection of a Yankee dryer. A Yankee dryer is a rotating steam-pressurized cylindrical vessel commonly used in the paper industry, and is made of cast iron, finished to a high surface quality, and characterized by a center shaft connecting the heads.

b) Yankee dryers are primarily used in the production of tissue-type paper products. When used to produce machine-glazed (MG) paper, the dryer is termed an MG cylinder. A wet paper web is pressed onto the finished dryer surface using one or two pressure (pressing) rolls. Paper is dried through a combination of mechanical dewatering by the pressure roll(s); thermal drying by the pressurized Yankee dryer; and a steam-heated or fuel-fired hood. After drying, the paper web is removed from the dryer.

c) The dryer is typically manufactured in a range of outside diameters from 8 to 23 ft. (2.4 m to 7 m), widths from 8 to 28 ft. (2.4 m to 8.5 m), pressurized and heated with steam up to 160 psi (1,100 kPa), and rotated at speeds up to 7,000 ft./min (2,135 m/min). Typical pressure roll loads against the Yankee dryer are up to 600 pounds per linear inch (105 kN/m). A thermal load results from the drying process due to difference in temperature between internal and external shell surfaces. The dryer has an internal system to remove steam and condensate. These vessels can weigh up to 220 tons (200 tonnes).

d) The typical Yankee dryer is an assembly of several large castings. The shell is normally a gray iron casting, in accordance with ASME designation SA-278. Shells internally may be smooth bore or ribbed. Heads, center shafts, and journals may be gray cast iron, ductile cast iron, or steel.

S5.2 ASSESSMENT OF INSTALLATION

a) The Inspector verifies that the owner or user is properly controlling the operating conditions of the dryer. The Inspector does this by reviewing the owner's comprehensive assessments of the complete installation, operating environment, maintenance, and operating history.

b) The dryer is subjected to a variety of loads over its life. Some of the loads exist individually, while others are combined. Consideration of all the loads that can exist on a Yankee dryer is required to determine the maximum allowable operating parameters. There are four loads that combine during normal operation to create the maximum operating stresses, usually on the outside surface of the shell at the axial center line. These are:

1) Pressure load due to internal steam pressure;

2) Inertial load due to dryer rotation;

3) Thermal gradient load due to the drying of the web; and

4) Pressure roll load (line or nip load)[5] due to pressing the wet web onto the dryer.

c) Steam pressure, inertial, and thermal gradient loads impose steady-state stresses. These stresses typically change when the dryer shell thickness (effective thickness for ribbed dryers) is reduced to restore a paper-making surface, the grade of tissue is changed or speed of the dryer is changed.

[5] Pressure roll load, line load, and nip load are terms that are used interchangeably to refer to the interaction between the pressure roll(s) and the Yankee dryer. It is called "nip" load because the pressure roll is rubber-covered and is pressed up against the Yankee with enough force to create a nip (or pinch) that forces the paper into line contact between the rolls and provides some mechanical dewatering. The paper then sticks onto the Yankee surface and follows the Yankee dryer for thermal dewatering by the steam-heated Yankee surface. This "nip load" is called a "line load" because the units are load (force) per length of line contact. The units are pounds per linear inch (PLI) and kilonewtons per meter (kN/m).

NB15-2304

e) Permitted materials can be either an ASME, SA material, or an ASTM Material permitted by NBIC Part 2, Table S6.15.1-b;

f) DOT Specification 106A ton tanks shall only use forged-welded heads, convex to pressure. The forged-welded heads shall be torispherical with an inside radius not greater than the inside diameter of the shell. The heads shall be one piece, hot formed in one heat so as to provide a straight flange at least 100 mm (4 inches) long. The heads must have a snug fit into the shell;

g) DOT Specification 110A ton tanks shall only use fusion-welded heads formed concave to pressure. The fusion-welded heads shall be an ellipsoid of 2:1 ratio and shall be of one piece, hot formed in one heat so as to provide a straight flange at least 38 mm (1-1/2 inches) long;

h) All longitudinal welded joints on DOT Specification 106A and DOT Specification 110A ton tanks shall be a fusion weld. DOT Specification 106A ton tank head-to-shell attachments shall be a forged-welded joint.[6] DOT Specification 110A ton tank head-to-shell attachments shall be a fusion weld;

i) Postweld heat treatment is required after welding for all DOT Specification 106A and Specification 110A ton tanks;

j) DOT Specification 106A and DOT Specification 110A ton tanks shall be of such a design as to afford maximum protection to any fitting or attachment to the head, including loading and unloading valves. The protection housing[5] shall not project beyond the end of the ton tanks and shall be securely fastened to the tank head;

k) If applicable, siphon pipes and their couplings on the inside of the ton tank's head and lugs on the outside of the tank head for attaching valve protection housing shall be fusion welded prior to performing postweld heat treatment;

l) DOT Specification 106A and DOT Specification 110A ton tanks are required to be equipped with one or more approved types of pressure relief devices. The devices shall be made out of metal and the pressure relief devices shall not be subject to rapid deterioration by the lading. The device's inlet fitting to the tank shall be a screw-type fitting and installed or attached directly into the ton tank's head or attached to the head by other approved methods. For thread connections, the following shall apply:

   1) The threaded connections for all openings shall be in compliance with the National Gas Taper Threads (NGT);

   2) Pressure relief devices shall be set for start-to-discharge, and rupture discs shall burst at a pressure not exceeding the pressure identified in NBIC Part 2, Table S6.15.1-a; and

m) Fusible plugs, if used, shall be required to relieve the pressure from the tank at a temperature not exceeding 79°C (175°F) and shall be vapor tight at a temperature not exceeding 54°C (130°F).

6 ~~The forged-welded joint shall be thoroughly hammered or rolled to ensure a sound weld.~~