

Date Distributed: October 15, 2020



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

NATIONAL BOARD SUBCOMMITTEE INSPECTION

AGENDA

Meeting of October 19th, 2020
WebEx Online Meeting

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

1. Call to Order (2 p.m. Eastern Time)
2. Introduction of Members and Visitors
3. Adoption of the Agenda
4. Public Review Comments

Item Number: PR20-0201	NBIC Location: Part 2, S10.10.4 c)	Attachment Page 2
Submitted by: Alexander Garbolevsky, Hartford Steam Boiler		
Related NBIC Action Item: Item NB16-1401 (Revise and update Supplement 10 on Inspection of CRPVs)		
Comment: No nomenclature is provided for the variables in Part 2, S10.10.4 c).		

Item Number: PR20-0202	NBIC Location: Part 2, S10.10.5	Attachment Page 4
Submitted by: Alexander Garbolevsky, Hartford Steam Boiler		
Related NBIC Action Item: Item NB16-1401 (Revise and update Supplement 10 on Inspection of CRPVs)		
Comment: “24 in.” appears twice as 610 mm and once as 609 mm in both the text and in the accompanying Figure.		

Item Number: PR20-0203	NBIC Location: Part 2, S2.6.2 c)	Attachment Page 6
Submitted by: Alexander Garbolevsky, Hartford Steam Boiler		
Related NBIC Action Item: Item 19-22 (Review of MAWP on Return Flue Boilers)		
Comment: 12 inches is converted as 300 mm, but everywhere else in NBIC it is 305 mm.		

Item Number: PR20-0204	NBIC Location: Part 2, S.2.6.2 h)	Attachment Page 8
Submitted by: Alexander Garbolevsky, Hartford Steam Boiler		
Related NBIC Action Item: Item 19-22 (Review of MAWP on Return Flue Boilers)		
Comment: “9 inch” is not SI converted.		

Item Number: PR20-0205	NBIC Location: Part 2, 4.2.1 c) 6) a.	Attachment Page 10
Submitted by: Alexander Garbolevsky, Hartford Steam Boiler		
Related NBIC Action Item: Item 18-62 (Remote inspection of confined space entries)		
Comment: 1/32” should be written as 1/32 in.		

Item Number: PR20-0206	NBIC Location: Part 2, 4.2.1 c) 6)	Attachment Page 14
b.		
Submitted by: Alexander Garbolevsky, Hartford Steam Boiler		
Related NBIC Action Item: Item 18-62 (Remote inspection of confined space entries)		
Comment: The conversion of 100 fc to 1086 Lux does not agree with Section V and ASTM (1076 Lux).		

5. Future Meetings

January 11-14, 2021 – TBD

July 12-15, 2021 – TBD

6. Adjournment

Respectfully submitted,

Jonathan Ellis

Jonathan Ellis
NBIC Secretary

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Public Review Comment Resolutions

1. **Accepted, changes are incorporated** – Accept/agree with the comment. Required non substantive changes are made to the draft addendum to address the comment and no substantive changes have been made.
2. **Accept in principle, new business item opened** - Accept/agree with the comment and will require additional work for future changes. (However current proposal is not technically wrong and provides guidance.) Requires a new action item for tracking for substantive changes.
3. **Accepted in principle and the item is being returned to the committee for action.** (Proposal may contain technical or other incorrect information.)
4. **Rejected for the following reason** – Complete comment is rejected. Reason must be given.

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

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

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

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

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

Date: September 18, 2020

Commenter Name: Alexander Garbolevsky

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

Commenter Phone: (774) 249-2803

Commenter Fax: _____

Commenter Email: alex_garbolevsky@hsb.com

Section/Subsection Referenced: Part 2, S10.10.4(c)

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

Item 16-1401, Part 2, S10.10.4 (c) – no nomenclature is provided for the variables

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

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Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, email: NBICSecretary@nationalboard.org

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Project Committee Referred To:

Comment No. Issued: PR20-0201

NBIC Subcommittee Inspection

S10.10.4 EQUIPMENT

a) Testing System

A testing system shall consist of:

- 1) sensors;
- 2) preamplifiers;
- 3) high pass and low pass filters;
- 4) amplifier;
- 5) A/D (analog-to-digital) converters;
- 6) a computer program for the collection of data;
- 7) computer and monitor for the display of data; and
- 8) a computer program for analysis of data.

Examination of the waveforms event by event shall always be possible and the waveforms for each event 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 shall be taken into account. Sensor sensitivity shall be at least 0.1 V/ nm.

c) Scaling Fiber Break Energy

The wave energy shall be computed by the formula:

$$u = \int v^2 dt/z$$

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Commenter Email: alex_garbolevsky@hsb.com

Section/Subsection Referenced: Part 2, S10.10.5

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

Item 16-1401, Part 2, S10.10.5 - "24 in." appears twice as 610 mm and once as 609 mm in both the text and in the accompanying Figure.

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

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Comment No. Issued: PR20-0202

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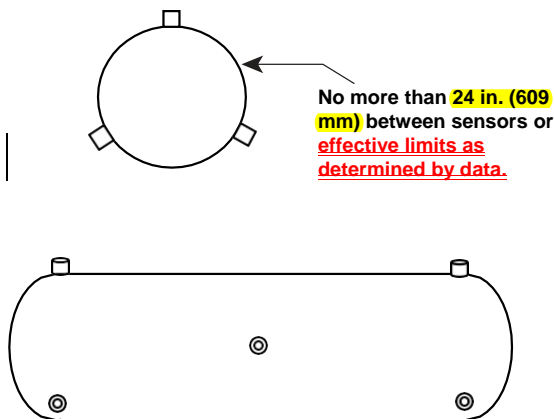
S10.10.5 SENSOR PLACEMENT

At least two sensors shall be used in any AE test regardless of vessel size so that electromagnetic interference (EMI) is easily detected by simultaneity of arrival. Sensors shall be placed at equal distances around the circumference of the vessel on the cylindrical portion of the vessel adjacent to the tangent point of the dome such that the distance between sensors does not exceed the greater of 24 in. (610 mm), or the effective sensing distance established by signal measurement. Adjacent rings of sensors shall be offset by $\frac{1}{2}$ a cycle. For example, if the first ring of sensors is placed at 0, 120, and 240 degrees, the second ring of sensors is placed at 60, 180, and 300 degrees. This pattern shall be continued along the vessel length at evenly spaced intervals, such intervals not to exceed the greater of 24 in. (610 mm), or the effective sensing distance established by signal measurement, until the other end of the vessel is reached. See Figure S10.10.4. The diameter referred to is the external diameter of a vessel.

Maximum distance between sensors in the axial and circumferential directions shall not exceed 24 inches (609 mm) unless it is demonstrated that the essential data can still be obtained using a greater distance and the authority having the jurisdiction concurs.

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

FIGURE S10.10.5
SENSOR SPACING AND PATTERN



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Section/Subsection Referenced: Part 2, Table S2.6.2(c)

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

Item 19-22, Part 2, S2.6.2(c) – 12 inches is converted as 300 mm, but everywhere else in NBIC it is 305 mm.

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

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Comment No. Issued: PR20-0203

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S2.6.2 ULTRASONIC THICKNESS TESTING

Ultrasonic thickness (UT) testing shall be performed to determine boiler plate thickness. UT testing shall be performed by personnel acceptable to the Jurisdiction and the Inspector. The following requirements shall be met, to the extent possible. Performance and results shall be acceptable to the Inspector and, if required, the Jurisdiction.

- a) Equipment, operator, and calibration standards used shall be documented.
- b) On initial UT of stayed sections, the plate thickness readings should be taken on a grid not exceeding the maximum staybolt pitch. Additional readings may be taken close to each staybolt to determine if localized thinning has occurred. Particular attention should be given to the joint between the staybolt and the plate.
- c) On initial UT of unstayed sections, the plate thickness readings should be taken on a grid not exceeding 12 inch (300mm) centers. Additional readings should be taken if conditions warrant.
- d) UT test results shall be documented so location of test results can be checked at subsequent UT tests to determine if material loss has occurred.
- e) Recurring UT testing shall be performed by randomly checking 10% of original UT checks. Areas of thinning identified during previous inspections shall be given particular attention. If material loss is determined, additional testing may be requested by the Inspector.
- f) Particular attention should be placed upon areas that typically exhibit thinning. These areas include the ogee curve, the mudlegs, the fusible plug, around feedwater inlets, and around the firebox door ring.
- g) The owner/operator shall maintain the initial and recurring grid mapped UT readings in conjunction with the calculations in permanent boiler records. Documentation shall be available to the Inspector for review and acceptance.
- h) Unstayed plain circular cylindrical components under external pressure shall require readings performed on a grid not exceeding 9 inch centers. Additional readings should be taken if conditions warrant.

Relevant NBIC Metrication Policy for reference:

7.2 EQUIVALENT RATIONALE

The rationale taken to convert metric units and US customary units involves knowing the difference between a soft conversion and a hard conversion. A soft conversion is an exact conversion. A hard conversion is simply performing a soft conversion and then rounding off within a range of intended precision. When values specified in the NBIC are intended to be approximate values, a hard conversion is provided. If an exact value is needed to maintain safety or required based on using good engineering judgment, then a soft conversion will be used. In general, approximate accuracy is acceptable for most repairs or alterations performed using the requirements of the NBIC. Therefore, within the NBIC, metric equivalent units are primarily hard conversions.

The following examples are provided for further clarification and understanding of soft conversions versus hard conversions:

Example 1: Using 1 in. = 25.4 mm;
12 in. = 304.8 mm (soft conversion)

Example 2: Using the above conversion, a hard conversion may be 300 mm or 305 mm depending on the degree of precision needed.

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Section/Subsection Referenced: Part 2, Table S2.6.2(h)

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

Item 19-22, Part 2, S2.6.2(h) – “ 9 inch” is not SI converted.

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

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Project Committee Referred To:

Comment No. Issued: PR20-0204

NBIC Subcommittee Inspection

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Commenter Email: alex_garbolevsky@hsb.com

Section/Subsection Referenced: Part 2, 4.2.1(a)

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

Item 18-62, Part 2:
4.2.1(a) – 1/32" should be written as 1/32 in.

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

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Comment No. Issued: PR20-0205

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1.4.1 PERSONAL SAFETY REQUIREMENTS FOR ENTERING CONFINED SPACES

- a) No pressure-retaining item shall be entered until it has been properly prepared for inspection. The owner or user and Inspector shall jointly determine that pressure-retaining items may be entered safely.

This shall include:

- 1) Recognized hazards associated with entry into the object have been identified by the owner or user and are brought to the attention of the Inspector, along with acceptable means or methods for eliminating or minimizing each of the hazards;
 - 2) Coordination of entry into the object by the Inspector and owner or user representative(s) working in or near the object;
 - 3) Personal protective equipment required to enter an object shall be used. This may include, among other items, protective outer clothing, gloves, respiratory protection, eye protection, foot protection, and safety harnesses. The Inspector shall have the proper training governing the selection and use of any personal protective clothing and equipment necessary to safely perform each inspection. Particular attention shall be afforded respiratory protection if the testing of the atmosphere of the object reveals any hazards;
 - 4) Completing and posting of confined space entry permits, as applicable; and
 - 5) An effective energy isolation program (lock out and/or tag out) is in place and in effect that will prevent the unexpected energizing, start-up, or release of stored energy.
- b) The Inspector shall determine that a safe atmosphere exists before entering the pressure-retaining item. The atmosphere shall be verified by the owner or user as directed by the Inspector.
- 1) The oxygen content of the breathable atmosphere shall be between 19.5% and 23.5%.
 - 2) If any flammable or combustible materials are present in the atmosphere they shall not exceed 10% of their Lower Explosive Limit (LEL) or Lower Flammable Limit (LFL).
 - 3) The Inspector shall not enter an area if toxic, flammable or inert gases, vapors or dusts are present and above acceptable limits.
- c) Remote visual inspection is an acceptable alternative to confined space entry provided the requirements of 4.2.1 c) are met and where allowed by the jurisdiction.

1.4.2 EQUIPMENT OPERATION

The Inspector shall not operate owner or user equipment. Operation shall be conducted only by competent owner or user employees familiar with the equipment and qualified to perform such tasks.

4.1 SCOPE

This section describes acceptable examination and test methods that are available to the Inspector during inspection of pressure-retaining items. This section also describes evaluation of test results and assessment methodologies.

4.2 NONDESTRUCTIVE EXAMINATION METHODS (NDE)

- a) Listed below is a variety of nondestructive examination methods that may be employed to assess the condition of pressure-retaining items. The skill, experience, and integrity of the personnel performing these examinations are essential to obtain meaningful results. The Inspector should review the methods and procedures to be employed to ensure compliance with jurisdictional requirements.
- b) Generally, some form of surface preparation will be required prior to use of these examination methods. When there is doubt as to the extent of a defect or detrimental condition found in a pressure-retaining item, the Inspector is cautioned to seek competent technical advice and supplemental NDE.
- c) Personnel performing examination and test methods shall have proper training and certification, as required by the owner and acceptable to the Inspector and Jurisdiction, if required.

4.2.1 VISUAL

- a) Visual examination is the basic method used when conducting an inservice inspection of pressure-retaining items. Additional examination and test methods may be required at the discretion of the Inspector to provide additional information to assess the condition of the pressure-retaining item.
- b) Visual examination is an inspection method to ascertain the surface condition of the pressure-retaining item. The Inspector should be aware of recognizing various surface features and comparing these features with damage mechanisms listed in NBIC Part 2, Section 3 that could indicate exposure of the pressure-retaining item to harmful corrosion or elevated temperature service.
- c) ~~In some cases the Inspector may have limited or no access while performing an inspection of the pressure-retaining item. Subject to approval of the Jurisdiction, remote camera or fiber optic devices may be considered acceptable methods to view and record the surface condition of the pressure-retaining item.~~ Remote Visual Inspection is an acceptable method of visual examination if the process is agreed upon by the owner and acceptable to the Inspector and Jurisdiction, if required.
 - 1) For Remote Visual Inspection, plans are reviewed and approved by the Inspector.
 - 2) The Inspector shall be present at time of data collection.
 - 3) The Inspector will be provided a dedicated monitor that has a resolution at least equal to that obtainable by direct observation, care should be taken to minimize glare on the viewing screen.
 - 4) The Inspector shall have direct communication with the operator of the remote visual camera.
 - 5) For Remote Visual Inspections, the final report is acceptable to the Inspector / Jurisdiction and all raw data is available to the Inspector / Jurisdiction as needed.

- 6) For Remote Visual Inspections, the inspection procedure shall reference a validated qualification of the equipment, including verification that the equipment is safe for use in the environment it will be operating in. Equipment validation will refer to ASME BPVC Section V. As a minimum the equipment shall meet:
 - a. $1/32"$ (0.8 mm) simulated defect identification
 - b. Minimum light intensity of 100 fc (1086 lux)
 - c. Not less than 30deg offset to the surface to be examined
 - d. Resolution at least equal to that obtainable by direct observation
- 7) All equipment used must produce results acceptable to the Inspector.

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Section/Subsection Referenced: Part 2, 4.2.1(b)

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

Item 18-62, Part 2:

4.2.1(b) - the conversion of 100 fc to 1086 Lux does not agree with Section V and ASTM (1076 Lux).

Source: ☐ Own Experience/Idea ☒ Other Source/Article/Code/Standard 2019 ASME Sec V

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Comment No. Issued: PR20-0206

NBIC Subcommittee Inspection