

Date Distributed:



*THE NATIONAL BOARD
OF BOILER AND PRESSURE VESSEL INSPECTORS*

NATIONAL BOARD INSPECTION CODE GRAPHITE TASK GROUP

MINUTES

Meeting of April 11th, 2023
Columbus, OH

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 Chair will call the meeting to order at 9:00 a.m. Eastern Time.

2. Introduction of Members and Visitors

The following Task Group members were present for the meeting:

- Mr. Aaron Viet, Chair
- Mr. Jonathan Ellis, Secretary
- Mr. Francis Brown
- Mr. Justin Clements
- Mr. Jesse Wince
- Mr. Andy Stupica
- Mr. Chris Cary
- Mr. Nolan Lee
- Mr. Tracy Rudy
- Mr. Richard Bulgin
- Mr. Keith Cummins

Enough members were present to establish a quorum for the meeting.

3. Announcements

Mr. Ellis announced that the 2023 edition of the NBIC will be available starting July 1, and that each Task Group member will be receiving a complimentary digital copy.

4. Adoption of the Agenda

A motion was made, seconded, and unanimously approved to adopt the agenda for this meeting.

5. Approval of the Minutes of the November 2022 Meeting

The minutes from the November 2022 Task Group meeting can be found on the National Board's website. Mr. Ellis also distributed a copy of the minutes to the group prior to the meeting.

A motion was made, seconded, and unanimously approved to accept the minutes from the November 2022 meeting.

6. Review of Rosters

- a. Membership nominations:
 - i. None.
- b. Membership reappointments:
 - i. Mr. Keith Cummins' membership is set to expire in July 2023.
 1. A motion was made, seconded, and unanimously approved to nominate Mr. Cummins for reappointment to the Task Group.
- c. Officer nominations:
 - i. No new officer nominations.

7. NBIC Business

Item Number: NB15-2208	NBIC Location: Part 3, S3	No Attachment
General Description: Investigate repair options for graphite block heat exchangers		
Subgroup: Graphite		
Task Group: G. Becherer (PM), A. Viet		
April 2023 Meeting Action: The group reviewed discussions from the previous meeting. They determined that there would be sketches for different cracks that could appear on a block, and that the procedure for repair would be plugging. Mr. Viet stated that he will continue to work on this.		

Item Number: NB19-73	NBIC Location: Part 3, S3	Attachment Page 1
General Description: Requirements for who can make hole plugging repairs on graphite blocks		
Subgroup: Graphite		
Task Group: A. Stupica (PM), C. Cary, S. Mehrez, A. Viet		
April 2022 Meeting Action: Mr. Viet reviewed the approved proposal from November for those who were not present at the meeting. The proposal will be presented at the July 2023 NBIC meeting.		

Item Number: 23-44	NBIC Location: Part 3, S3.3 a)	Attachment Page 4
General Description: Gasket Surface Repair		
Subgroup: Graphite		
Task Group: A. Viet (PM)		
April 2023 Meeting Action: The task Group discussed the possibility of adding to S3.3 a) 6) a limit of 3/16" depth for a cement-only repair of gasket surfaces. Discussion was held on how to note that the repair would be for a linear scratch/gouge. It was determined that it would make more sense to add to S3.3 a) 2) since it deals specifically with gasket surfaces. By putting it in that section, "gasket surface" would be enough of a limiter that it would only need to include a depth limitation (3/16"). A question was asked about the need to include additional language in the routine repairs section to cover similar repairs on the surface besides the gasket surface; these repairs would be considered cosmetic. The Task Group decided to move forward with the change to S3.3 a) 2) and will take time to think about how to address other surface repair where cement would be used. A motion was made, seconded, and unanimously approved to accept the proposed change to S3.3 a) 2).		

Item Number: 23-44	NBIC Location: Part 3, S3.5.4	Attachment Page 5
<p>General Description: Mr. Francis Brown proposal to revise S3.5.4 m) By email of 01NOV2022, Mr. Brown proposed to revise 3.5.4 m) to read: The following statement shall be included on the R-1 form. The tubes defined in subparagraph f) were plugged per S3.5.4 f). The existing 3.5.4 m) says: “The scope of the work completed shall be described and reported on a Form R-1.”</p> <p>Subgroup: Graphite</p> <p>Task Group: Mr. Francis Brown</p> <p>April 2023 Meeting Action: The TG worked on a proposal for changing S3.5.4 m) to specifically say that “R” stamp holders without the G designator would need to specify on Form R-1 that they are using the provisions of S3.5.4 f). After finalizing the proposal, a vote was held, and the proposal was unanimously approved.</p>		

Item Number: 23-45	NBIC Location: Part 3, S3	Attachment Page 6
<p>General Description: Graphite plate replacement as Routine repair</p> <p>Subgroup: Graphite</p> <p>Task Group: Mr. Jesse Wince</p> <p>April 2023 Meeting Action: The TG made some adjustments to original proposal, and then voted unanimously to approve the amended proposal.</p>		

Item Number: TBD	NBIC Location: Part 3, S3	No Attachment
<p>General Description: Requirement for G-mark when replacing parts</p> <p>Subgroup: Graphite</p> <p>Task Group: A Viet, J. Wince, S. Mehrez</p> <p>November 2022 Meeting Action: S3.2 h) and S3.1 b) appear to require a G-mark for a User to replace parts such as blocks. Refer to Minutes for September 2022 meeting for additional background. Group discussion established that any application of cement requires a G-mark except as per S3.5.4 f). There was additional discussion about various part replacement scenarios and whether they would require a G- or R-stamp. It is proposed to develop an alternative procedure for parts replacement by non-G-stamp holders. There was general agreement that such repairs would not be Routine. Note that a User is free to disassemble and reassemble existing parts, along with cleaning, inspection, replacement of packing and gaskets, etc.</p> <p>April 2023 Meeting Action: The TG reviewed previous discussion for this item. The group agreed that if someone want to make a code repair, they should get an R stamp with a G designator. Someone could make the repair without stamp, but it would not be a code repair. Discussion was held on writing rules similar to the rules for tube plugging so that R stamp holders without the G mark could perform the repair. Would doing this nullify needing to get the G mark? Further discussion was held on what goes into getting a G mark. Mr. Viet stated he would do some research on this subject and ask Mr. Sam Mehrez for his input.</p>		

Item Number: 23-46	NBIC Location: Part 3, S3	Attachment Page 7
General Description: Requirements for Inlays as Routine repairs		
Subgroup: Graphite		
Task Group: Mr. Justin Clements (PM)		
April 2023 Meeting Action: The Task Group reviewed previous discussion on the item from November, including potentially increasing the inlay limit to 64in ³ or 10% of total volume. The original proposal was amended to include those numbers. Discussion was held on whether plug stitching could be considered a routine repair under the new language, and if it should be considered a routine repair. The Group ultimately decided to exclude plug stitching. A Motion was made, seconded, and unanimously approved to accept the amended proposal.		

8. New Business

None.

9. Future Meetings

NBIC Meeting – July 10th-13th, 2023 – St. Louis, MO

TG Graphite – July 25-26, 2023 – Columbus, OH at NBBI HQ

Fall TG Graphite Meeting – October 24-25, 2023 in Clearwater, FL

10. Adjournment

Mr. Viet adjourned the meeting at 2:30 p.m. Eastern Time.

Respectfully submitted,

Jonathan Ellis

Jonathan Ellis
NBIC Secretary

S3.3 ROUTINE REPAIRS

a) The following repairs shall be considered routine, and shall comply with NBIC Part 3, 3.3.2.

- 1) Machining — routine repair shall not include the machining of pressure-retaining parts with the exception of minor machining for cleaning and joint preparation not to exceed 1/32 in. (0.8 mm) of material thickness.
- 2) Repair of Gasket Surfaces — re-machining of gasket surfaces, re-serrating, or flattening is permitted if the design thickness is maintained.
- 3) Replacing Individual Tubes — drilling out and replacing tubes with new tubes or repaired tubes. Only certified materials shall be used for this repair.
- 4) Nozzle Replacement — replacement of nozzles by removing the old nozzle and cementing a new nozzle in place. This is applicable for nozzles with inside diameters not exceeding 6 inches (152 mm).
- 5) Plugging Tubes or Block Holes — plugging individual ~~tubes~~ tubes or block holes using accepted procedures.
- 6) Surface Repair — surface repair by installation of plugs or inlay material shall not exceed 1 in.³ (16 cm³) of total volume.
- 7) Replacement or Addition of Non-Load Bearing Attachments to Pressure-Retaining Item — For attachment of non-load bearing attachments to pressure-retaining items, the cementing procedure specification need only be qualified for the pressure part and cement to be used.

S3.5.4 PLUGGING OF LEAKING OR DAMAGED TUBES OR BLOCK HOLES

a) The material used for plugging ~~tubes~~ shall comply with the requirements of the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, Part UIG.

b) The point(s) of leakage shall be verified, and the corresponding leak site(s) shall be marked/labeled on the ~~tubesheet, and part and~~ recorded.

c) A plug shall be used to plug each end of the ~~tube~~ hole(s) in question and each plug shall have a minimum length of 1 in. (25 mm). Multiple plugs may be used.

d) The ~~tube~~ hole(s) shall be prepared for plugging ~~by enlarging the inside of the tube(s) with a suitable drill bit or reamer tool, as long as the maximum hole I.D. to plug O.D. clearance of 3/32 in. (2.4 mm) is not exceeded.~~

1) To ensure a sound cement joint between the ~~tube inner hole~~ sidewall and the plug, a slightly smaller diameter plug shall be selected. The maximum clearance between the ~~tube hole~~ inside diameter and the outside diameter of the plug shall not exceed 3/32 in. (2.4 mm).

~~2) As an alternative to d) 1) a mandrel with an abrasive, such as sandpaper, may be used, as long as the maximum tube I.D. to plug O.D. clearance of 3/32 in. (2.4 mm) is not exceeded.~~

~~23) The minimum plug insertion depth of the prepared hole(s) shall meet the minimum combined plug length requirements of “c” S3.5.4 c). When the minimum plug length of “c” is exceeded, the total insertion depth of the plugs may exceed the combined length of the plugs; however, the longer plugs shall not project outside the face of the tube hole(s) being plugged.~~

e) Plugging ~~of leaking or damaged tubes or block hole tubes~~ shall be performed by certified cementing technicians, using qualified cementing procedures, in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, Part UIG.

f) As an alternative to e) any “R” Certificate Holder, with or without the letter “G” included on the “R” *Certificate of Authorization*, may install graphite ~~tube~~ plugs, provided the following conditions are met. The “R” Certificate Holder shall gain the concurrence of the Inspector, and shall utilize a tube plugging kit provided by an ASME Certificate Holder authorized to use the “G” designator. The kit shall include the following items:

1) Certified graphite plugs and certified cement ingredients, both accompanied by the appropriate documentation (Partial Data Report).

2) The qualified cementing procedure of the ASME Certificate Holder authorized to use the “G” designator, and a step-by-step procedural checklist that shall be followed explicitly. The procedure shall address the entire ~~tube~~ plugging process including plug configuration, ~~tube~~ hole cleaning and preparation, mixing and applying of the cement, application of the plugs, securing the plugs during the curing process, controlling the curing process, and leak testing, thereby meeting S3.3.

3) Additional materials and procedure shall be provided and used to prepare a demonstration plug joint prior to performing the repair. This demonstration plug joint shall be tested by a twist (torsional) test designed to demonstrate acceptable application and curing of the cement (Fig. S3.5.4). The test procedure shall include acceptance criteria, which may be based on a principle of breakage of part of the test piece. A successful twist test, in conjunction with the completed procedural checklist, shall serve as a valid cement technician certification for a single repair operation. The twist test shall be witnessed by the Inspector.

The “R” Certificate Holder shall review the material certifications including verification that the shelf life of the cement has not been exceeded, and assure that the certified cement technician has completed the qualification demonstration, and has access to the procedure and checklist. The Inspector shall review and verify that the procedure and the other elements of the certified kit, as provided by the ASME Certificate Holder authorized to use the “G” designator, have been administered and completed prior to his acceptance. The “R” Certificate Holder shall note on Line 8 of the R-1 Form the installation of cemented graphite ~~tube~~ plugs in accordance with this section. The letter “G” shall not be applied to the vessel when performing this alternative repair. The “R” Certificate Holder shall identify and document the location of the plugged ~~tubes~~ on the “R” Form.

g) The cement shall be prepared per the cement manufacturer’s instructions.

h) When cementing the plugs, 100% of individual plugs, as well as the inside diameter of the ~~tube hole(s) opening(s)~~, shall be coated with cement. The plugs shall then be inserted one by one, against each other, into each end of the ~~tube hole(s)~~ being plugged.

i) Once the plugging is completed, and before the cement cures, the endplugs may need to be held in place, as newly cemented plugs may exhibit a tendency to dislodge from the plugged ~~tube hole(s)~~ prior to final curing of the cement.

j) Curing time is dependent upon the cement manufacturer’s instructions, and is considered complete when the cement is hardened to the point that it cannot be indented with pressure from a flat screwdriver or other similar instrument.

| k) After the cement is completely cured, the ~~plugged, cemented area(s) on the tubesheet/block sur~~face may be dressed with sandpaper or other suitable abrasive.

| l) ~~Repaired tubes or block holes~~ The repair shall be tested in accordance with this code, using a method acceptable to the Inspector, with a written procedure as approved by the manufacturer's internal quality system, to ensure leaks have been repaired.

m) The scope of the work completed shall be described and reported on a Form R-1.

S3.3 ROUTINE REPAIRS

a) The following repairs shall be considered routine, and shall comply with NBIC Part 3, 3.3.2.

1) Machining — routine repair shall not include the machining of pressure-retaining parts with the exception of minor machining for cleaning and joint preparation not to exceed 1/32 in. (0.8 mm) of material thickness.

2) Repair of Gasket Surfaces

a. — Re-machining of gasket surfaces, re-serrating, or flattening is permitted if the design thickness is maintained.

b. Gasket surface damage repair by cement only is permitted, provided that the damaged area is no deeper than 3/16 in. (5 mm).

Item 23-44

Part 3, S3.5.4 m)

m) The scope of the work completed shall be described and reported on ~~a~~ Form R-1. When the work is performed in accordance with S3.5.4 f), the "R" Certificate Holder shall note on Form R-1 in "Remarks": "Repaired in accordance with NBIC Part 3, S3.5.4 f)."

Item 23-45

Part 3, S3.2 and S3.3 a)

S3.2 Repairs

k) Blind cracks and delaminations ~~may shall~~ not be repaired by cement injection only.

l) Cracks and porosity in tubes ~~may shall~~ not be repaired. Cracked and porous sections may be removed so that the remainder of the tube may be used. Individual tube sections shall not be less than 24 in. (610 mm) in length, and the number of segments in a tube shall not exceed the quantity listed in NBIC Part 3, Table S3.2.

~~+)m) -Cracks and porosity in graphite plates used in plate and frame exchangers shall not be repaired.~~

S3.3 Routine Repairs

a)

8) Replacing graphite plate(s) with new plate(s) in a plate and frame exchanger. Only certified materials shall be used for this repair.

Item 23-46
Part 3, S3.3 a) 6)

S3.3 ROUTINE REPAIRS

a) The following repairs shall be considered routine, and shall comply with NBIC Part 3, 3.3.2.

- 1) Machining — routine repair shall not include the machining of pressure-retaining parts with the exception of minor machining for cleaning and joint preparation not to exceed 1/32 in. (0.8 mm) of material thickness.
- 2) Repair of Gasket Surfaces — re-machining of gasket surfaces, re-serrating, or flattening is permitted if the design thickness is maintained.
- 3) Replacing Individual Tubes — drilling out and replacing tubes with new tubes or repaired tubes. Only certified materials shall be used for this repair.
- 4) Nozzle Replacement — replacement of nozzles by removing the old nozzle and cementing a new nozzle in place. This is applicable for nozzles with inside diameters not exceeding 6 inches (152 mm).
- 5) Plugging Tubes — plugging individual tubes using accepted procedures.
- 6) Surface Repair — surface repair by installation of ~~plugs or~~ inlay material shall not exceed ~~644~~ in.³ (~~104946~~ cm³) in total or ten percent of the total volume of the part, whichever is less. Surface repair does not include plug stitching.
- 7) Replacement or Addition of Non-Load Bearing Attachments to Pressure-Retaining Item — For attachment of non-load bearing attachments to pressure-retaining items, the cementing procedure specification need only be qualified for the pressure part and cement to be used.