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THE NATIONAL BOARD
OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD INSPECTION CODE SUBCOMMITTEE INSTALLATION

MINUTES

Meeting of July 13, 2022
Indianapolis, IN

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The National Board of Boiler & Pressure Vessel Inspectors
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1. **Call to Order**

The start of the meeting was delayed so the subcommittee could watch a presentation on graphite/carbon fiber at the Repairs and Alterations meeting. After the presentation, Mr. Patten called the meeting to order at 9:04 a.m. (EDT).

2. **Introduction of Members and Visitors**

Mr. Patten held roll call with the members and visitors. Each member and visitor (in person and remote) introduced themselves with their name and company/interest category. All attendees are listed on **Attachment pages 1 – 3.**

3. **Check for a Quorum**

With 13 out of 15 members present (in person and remote), a quorum was met.

4. **Awards/Special Recognition**

Mr. Luis Ponce presented Mr. Rex Smith with a pin for his five years of service as a member of Subcommittee Installation.

5. **Announcements**

Mr. Patten gave the announcements:

- The National Board will be hosting a reception on Wednesday evening from 6:30 p.m. to 8:30 p.m. in City Way Gallery at the hotel.
- The National Board will be hosting breakfast and lunch on Thursday. Breakfast will be served from 7:00 a.m. to 8:00 a.m., and lunch will be served from 11:30 a.m. to 12:30 p.m. Both meals will be served in the Market Table Restaurant at the hotel.
- This meeting is the last at which items can be approved for inclusion in the 2023 edition of the NBIC.

6. **Adoption of the Agenda**

Before adopting the agenda, Item 22-23 was added, as well as an Officer appointment for Subgroup Chair. A motion was made to adopt the agenda as amended. The motion was seconded and unanimously approved.

7. **Approval of the Minutes of the January 19, 2022, Meeting**

A motion to approve the minutes from the January 19, 2022, subcommittee meeting was made. The motion was seconded and unanimously approved.

8. **Review of Rosters**

a. **Membership Nominations**

Mr. Rodger Adams (Authorized Inspection Agencies) and Mr. Jeff Kleiss (Manufacturers) have expressed interest in becoming **subgroup members**.

Mr. Jeff Kleiss was admitted to a Zoom breakout room, and Mr. Rodger Adams left the room for the subcommittee to discuss. There was a brief discussion on balance of interest, but it subsided quickly; balance of interest is necessary within subcommittee membership, but not subgroup membership. A motion was made to approve both nominees as members of the subgroup. The motion was seconded and unanimously approved.

b. Membership Reappointments

Mr. Randy Austin's membership to **Subgroup Installation** and **Subcommittee Installation** is set to expire prior to the January 2023 NBIC meetings.

Mr. Austin informed the subgroup the day before that he will not be running for reappointment.

Mr. Matt Downs' membership to **Subcommittee Installation** is set to expire prior to the January 2023 NBIC meetings.

Since Mr. Downs was not present at the meeting, Ms. Wadkinson informed us that Mr. Downs would like to renew his membership to the subcommittee. A motion was made for Mr. Downs to continue as a member of Subcommittee Installation. The motion was seconded and unanimously approved.

c. Officer Appointments

Mr. Joe Brockman was recommended for the position of subgroup Chair. Mr. Brockman left the room for the subcommittee to discuss. A motion was made to accept Mr. Brockman as Chair of the subgroup. The motion was seconded and unanimously approved.

9. Open PRD Items Related to Installation

- NB15-0305 – Create Guidelines for Installation of Overpressure Protection by System Design – D. Marek (PM)
- NB15-0315 – Review isolation valve requirements in Part 1, 4.5.6 and 5.3.6 – D. DeMichael (PM)
- 17-119 – Part 4, 2.2.5 states that pressure setting may exceed 10% range. Clarify by how much – T. Patel (PM). This Item is on hold pending ASME action.
  - This item may close with no action. PRD is waiting to hear back from the Project Manager.
- 19-83 – Address Alternate Pressure Relief Valve Mounting Permitted by ASME CC2887-1 – D. Marek (PM).
  - This item failed Subcommittee Installation's letter ballot. The Project Manager still needs to respond to the ballot comments.
- 22-08 – Review and improve guidance for T&P valve installation relating to probe.
  - Mr. Clark has been added to the task group. The task group is looking into providing guidance on the specific location of the T&P valve. The temperature probe must be located in the hottest water of the tank in order for the valve to actuate at the specified temperature.
- 22-15 – What is the meaning of "service limitations" as used in Part 4, 2.4.5?
  - Mr. Clark has been added to the task group.
- 22-16 – Allow the use of pressure relief valves on potable water heaters.
  - Mr. Clark was added to the task group and so reported on this item. There was some discussion regarding ASME Section IV's allowance of pressure relief valves in place of T&P valves on potable water heaters. However, there are not clear distinctions on the conditions that allow for this substitution. The task group is trying to create a proposal that will align with ASME's allowance of pressure relief valves on potable water heaters. But clear distinctions on when this is and is not permitted need to be defined.

10. Interpretations

There are no Part 1 interpretation requests to address.

11. Action Items

Item Number: 20-27	NBIC Location: Part 1, 1.6.9 & S6.3	No Attachment

General Description: Carbon Monoxide Detector/Alarm NBIC 2019

Subgroup: SG Installation

Task Group: E. Wiggins (PM), G. Tompkins, R. Spiker, R. Smith, S. Konopacki, R. Austin, T. Creacy, and J. Kleiss

Explanation of Need: These codes are being enforced by some jurisdictions on existing installations. Inspectors need to know what codes we need to enforce. Do the detectors have specific levels of CO when an alarm is to go off? Is there a requirement for an audible alarm or decibel level of the alarm? Where in the boiler room should the alarm/monitor be mounted?

July 2022 Meeting Action: Progress Report

The subcommittee discussed how various jurisdictions are handling this issue. Mr. Patten stated that it was already decided at the previous subcommittee meeting that this item would be moved to the Executive Committee to discuss whether to incorporate this topic into a standalone document or to revise the NBIC Introduction to include terms other than pressure-retaining devices (e.g., CO alarms and controlled equipment). This item is on the Executive Committee's agenda for the January 2023 meeting.

Item Number: 20-33	NBIC Location: Part 1	No Attachment

General Description: Flow or Temp Sensing Devices forced Circulation Boilers

Subgroup: SG Installation

Task Group: M. Downs (PM), D. Patten, M. Wadkinson

Explanation of Need: Incorporation of applicable CSD-1 requirements.

July 2022 Meeting Action: Progress Report

Mr. Patten reported that the task group has been unable to move forward until they hear back from ASME Section IV.

Item Number: 20-44	NBIC Location: Part 1	No Attachment

General Description: CW Vacuum Boilers

Subgroup: SG Installation

Task Group: R. Spiker (PM), M. Washington, and M. Byrum

Explanation of Need: Incorporation of applicable CSD-1 requirements.

July 2022 Meeting Action: Progress Report

Mr. Spiker stated that the task group is still seeking information from technical maintenance sources; but if they cannot progress in that direction, they will create a proposal that incorporates CSD-1 requirements.

Item Number: 20-62	NBIC Location: Part 1, 1.4.5.1	No Attachment

General Description: Update the National Board Boiler Installation Report

Subgroup: SG Installation

Task Group: T. Clark (PM), E. Wiggins, R. Spiker, T. Creacy, P. Jennings, G. Tompkins, and D. Patten.

Explanation of Need: The form has not been updated in years. The form will be part of the National Board's Jurisdictional Reporting System which is currently under development.

July 2022 Meeting Action: Progress Report

Mr. Clark reported that the task group cleaned up and condensed their proposal. The next step is to get feedback from the Chiefs via the National Board's Members Forum. After that, the National Board will draft a format for the report, and then a proposal will be created for the January 2023 meeting. JRS intends to use this form as the base of their report platform but will finetune it to each Jurisdiction's requests.

Item Number: 20-86	NBIC Location: Part 1, 2.10.1 a)	No Attachment

General Description: Testing and Acceptance: Boil-out Procedure

Subgroup: SG Installation

Task Group: E. Wiggins (PM), D. Patten, M. Washington, and S. Konopacki (remote).

Explanation of Need: This was brought to my (Mr. Eddie Wiggins) attention by Ernest Brantley. Mr. Brantley indicated during an acceptance inspection, he found boiler with excessive oil on the tubes and tube sheet after boiler was delivered and installed. He could not find any reference to boil-out to remove this extraneous material.

July 2022 Meeting Action: Progress Report

Mr. Wiggins reported that he is moving this item to Part 1, Section 1.6.10. He is continuing to work on a proposal that will incorporate the topic of steam blowing. A new item regarding boil-out procedure should be opened in Part 3.

12. New Items:

Item Number: 22-10	NBIC Location: Part 1, S1	Attachment Pages 4 – 9

General Description: Changes to Yankee Dryer P1_S1

Subgroup: SG Installation

Task Group: J. Jessick (PM); M. Richards; R. Spiker

Explanation of Need: Various updates including to recognize steel in addition to cast iron, and to promote consistency of Supplements of each Part.

July 2022 Meeting Action: Proposal

Mr. Patten reported on the discussion they had at the subgroup meeting. Mr. Jessick briefly explained the new proposal. The subcommittee discussed S1.2 f) for a while, and eventually reworked that part of the proposal. Mr. Spiker made a motion to accept the revised proposal. The motion was seconded and unanimously approved.

Item Number: 22-13	NBIC Location: Part 1, 3.8.2.2	No Attachment

General Description: Align hot water boiler thermometer requirements with ASME Section IV

Subgroup: SG Installation

Task Group: Tom Clark (PM), Patrick Jennings, Rodger Adams, Gene Tompkins, D. Zalusky

Explanation of Need: NBIC Part 1 does not expressly permit the use of temperature sensors or digital displays as thermometers for hot-water heating or supply boilers, even though they are permitted under ASME Section IV, HG-612. NBIC Part 1 also does not address the required temperature range of thermometers, inconsistent with ASME Section IV.

July 2022 Meeting Action: Progress Report

Mr. Clark explained two approaches that could be taken on this item: 1) revise the wording to allow for the use of a digital thermometer or probe; or 2) revise the verbiage to be consistent with ASME Section IV.

Item Number: 22-23	NBIC Location: All parts, Section 8	Attachment Page 10

General Description: Removing Section 8 from all 4 Parts of the NBIC

Subgroup: SG Installation

Task Group: G. Scribner (PM)

Explanation of Need: The current wording in Section 8 is obsolete, and the actual process for submitting requests for Interpretations, Code Revisions, and Code Additions is now located in the Introduction of the NBIC.

July 2022 Meeting Action: Proposal

Mr. Scribner summarized his proposal. Since the content from Section 8 was added to the Introduction, Section 8 is no longer needed. So that there is not an irrelevant section in the 2023 edition, temporary text (for a period of one cycle) has been added to Section 8. After this cycle, Section 8 will be eliminated, and the other sections will be renumbered where applicable. There was a motion to accept the proposal as presented. The motion was seconded and unanimously approved.

13. New Business

There was no new business to discuss.

14. Future Meetings

- January 2023 – Charleston, SC
- July 2023 – TBD

13. Adjournment

Mr. Patten made a motion to adjourn the meeting at 11:07 a.m. (EDT). The motion was seconded and unanimously approved.

Respectfully submitted,

Michelle Vance
Subcommittee Installation Secretary

Subcommittee Installation Attendance: July 13, 2022

MEMBERS:	Interest Category	In Person	Remote	Not In Attendance
Don Patten	Manufacturers	x		
Edward Wiggins	Jurisdictional Authorities		x	
Gene Tompkins	Manufacturers	x		
H. Michael Richards	General Interest		x	
J. Matt Downs	Manufacturers			x
Joe Brockman	Authorized Inspection Agencies	x		
Melissa Wadkinson	Manufacturers	x		
Milton Washington	Jurisdictional Authorities	x		
Patrick Jennings	Authorized Inspection Agencies	x		
Randy Austin	Users			x
Rex Smith	Authorized Inspection Agencies	x		
Ron Spiker	Jurisdictional Authorities	x		
Stanley Konopacki	Users		x	
Todd Creacy	Authorized Inspection Agencies	x		
Tom Clark	Jurisdictional Authorities	x		
Michelle Vance	Secretary	x		

VISITORS:	Company / Interest	In Person	Remote
Bryan Ahee	Bradford White Corporation	x	
David Warshall	New York City		x
David Zalusky	CNA Insurance	x	
Jeff Kleiss	Lochinvar, LLC.		x
Jerry Jessick	Fusion Integrated Solutions	x	
Jim Byrum	ABIIC / ARISE	x	
Rob Troutt	BOT Chair / State of Texas	x	
Robert Smith	NAVFAC	x	
Rodger Adams	Zurich Resilience Solutions	x	
Gary Scribner	NBBI Staff	x	
Luis Ponce	NBBI Staff	x	

NBIC Subcommittee Installation Attendance - 7/13/2022					
First Last	Email	Company	Phone #	Signature	Attending Reception?
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Michelle Vance	mvance@nationalboard.org	The National Board	614-888-8320		
Stanley Konopacki	Stanley.Konopacki@nrg.com	NRG	815 372-4740		
H. Michael Richards	Hmichaelrichards.pe@gmail.com	Southern Co.	205 706-0748		
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Matt Downs	mdowns@weil-mclain.com	Weil-McLain	219 879-6561		
~~Edward Wiggins~~	~~Edward.Wiggins@bpcllcga.com~~	~~XL Insurance America~~	~~770 614-3111~~		
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DAVID ZALUSKY	DAVID.ZALUSKY@CNA.COM	CNA	410-841 9781		
Rob Smith	robert.e.smith@navy.mil	NAVFAC	240 543 9259		

NBIC Subcommittee Installation Attendance - 7/13/2022					
First Last	Email	Company	Phone #	Signature	Attending Reception?
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Ron Spikes	ronndj@gmail.com	state of SC	803 608 1430		Y

SUPPLEMENT 1
INSTALLATION OF YANKEE DRYERS ~~(ROTATING PRESSURE VESSELS) WITH FINISHED SHELL OUTER SURFACES~~

S1.1 SCOPE

(21)

This supplement provides guidelines for the installation of a yankee dryer. ~~-~~Additional guidelines are found in Part 2 for Inspection, and Part 3 for Repair and Alteration.

~~A yankee dryer has the following characteristics:~~

a) A yankee dryer ~~It~~ is a rotating steam-pressurized cylindrical vessel commonly used in the paper industry~~, and is typically made of cast iron, finished to a high surface quality, and~~.~~-~~ It is characterized by a center shaft connecting the heads. While traditionally made of cast iron, bolted or welded steel vessels are in use.

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~~yankee dryer~~,~~;~~ and a steam-heated or fuel-fired hood. After drying, the paper web is removed from the dryer.

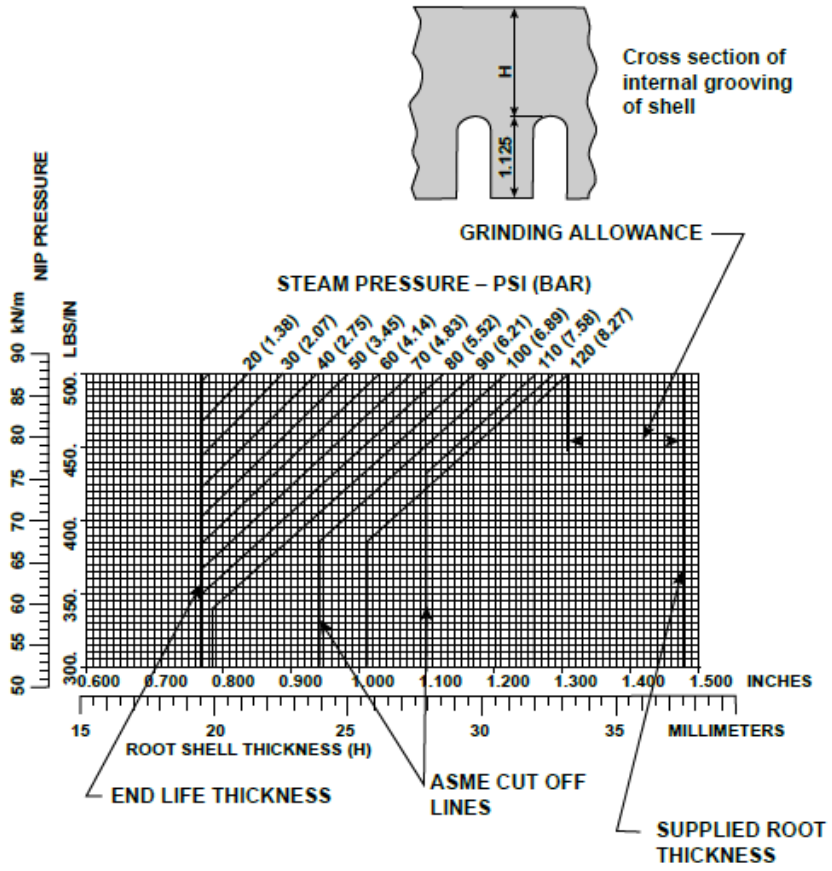
c) ~~A yankee~~The dryer is typically manufactured in a range of outside diameters from 8 to 23 ft. (2.4 m to 7 m), widths from 8 to 28 ft. (2.4 m to 8.5 m), pressurized and heated with steam up to 160 psi (1,100 kPa), and rotated at speeds up to 7,000 ft~~/~~./min (2,135 m/min). Typical pressure roll loads against the ~~Yankee~~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 components. The cylindrical shell is commonly ASME SA-278 gray cast iron~~,~~ or SA-516 steel. ~~Shells internally~~Internally, shells may be smooth bore or ribbed. Heads, center shafts, and journals may be gray cast iron, ductile cast iron, or steel.

~~**FIGURE S1.1**~~

~~A TYPICAL MANUFACTURER'S "DE-RATE CURVE"~~

~~NOTE: There are several safe operating pressures for a given shell thickness.~~



S1.2 ~~ASSESSMENT OF~~ INSTALLATION ASSESSMENT

a) The Inspector verifies that the owner or user is prepared to properly ~~controlling~~control the operation of the dryer such that maximum operating conditions ~~of the dryer.~~are not exceeded. The maximum operating conditions are provided by the dryer manufacturer or a source acceptable to the Inspector ~~does this by reviewing the owner's comprehensive assessments~~and can be in the form of ~~the complete installation~~a derate curve or drawing with listed parameters.

b) The dryer is subjected to a variety of loads over its life. Some of the loads exist individually, while others are combined. Considerations of all the loads that can exist on a Yankee dryer are 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 loads and the associated protection devices provided to limit these loads are:

1) Pressure load due to internal steam pressure. Overpressure protection is provided by a safety relief valve;

2) Inertial load due to dryer rotation. Over-speed protection is usually provided by an alarm that indicates higher-than-allowable machine speed;

3) Thermal gradient load due to the drying of the web. Protection against unusual drying loads is usually provided by logic controls on the machine, primarily to detect a "sheet-off" condition that changes the thermal load on the shell exterior from being cooled by the tissue sheet to being heated by the hot air from the hood; and

4) Pressure roll load (line or nip load) due to pressing the wet web onto the dryer. Overload protection is usually provided by a control valve that limits the pneumatic or hydraulic forces on

the roll loading arms such that the resultant nip load does not exceed the allowable operating nip load.

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.

d) The pressure roll(s) load imposes an alternating stress on the shell face. The resulting maximum stress is dependent on the magnitude of the alternating and steady-state stresses.

e) ASME Section VIII, ~~Division~~Div. 1,~~ of the ASME Code~~ only provides specific requirements for the analysis of pressure loads. Although the Code requires analysis of other loads, no specific guidance for thermal, inertial, or pressure roll loads is provided. Hence, additional criteria must be applied by the manufacturer to account for all the steady-state and alternating stresses.

f) To maintain product quality, the dryer surface is periodically refurbished by grinding. This results in shell thickness reduction. Therefore, the manufacturer does not provide a single set of maximum allowable operating parameters relating steam pressure, rotational speed, and pressure roll load for a single design shell thickness. The manufacturer, or another qualified source acceptable to the Inspector, instead provides a series of curves that graphically defines these maximum allowable operating parameters across a range of shell thicknesses. This document is known as the “De-rate Curve.” ~~(~~See NBIC Part 1, Figure S1.1~~).~~. ~~In~~ cases where no de-rate curve is provided the manufacturer, or another qualified source, shall provide operating conditions that include a minimum shell thickness.

g) Thermal spray (metallizing) materials may be applied to extend and improve dryer operations and provide a more wear resistant surface. Thermal spray coatings are often applied to the exterior of steel shells and may be applied to cast iron shells. Once applied, the metallization may be ground periodically before it is removed or replaced. Thermal spray coatings do not add strength to the component and are not included in shell thickness calculation. Grinding that reduces thickness of the pressure containing shell material to which metallization has been applied must be evaluated for any necessary pressure and safety device re-settings.

~~g)~~h) In addition to the loads on the ~~Yankee~~yankee dryer due to operation, other nonstandard load events can occur during shipment and installation into the paper machine. These nonstandard load events should be recorded in an incident log. Examples of nonstandard load events include:

1) Damage to the protective packaging of the Yankee dryer during transport~~;~~ and installation

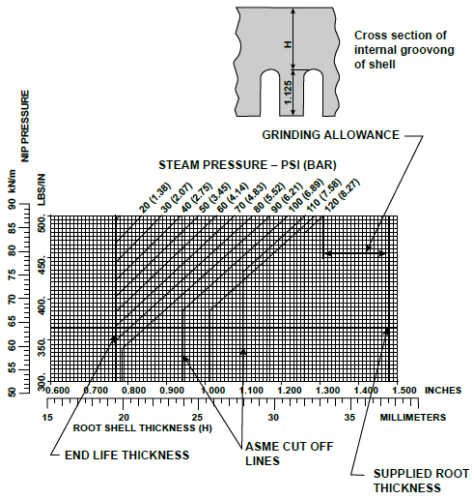
2) Scratches, gouges, dents ~~in~~of the ~~Yankee~~yankee dryer ~~shell~~ during packaging removal or installation into the paper machine~~;~~, or undesirable mechanical contact between the yankee and other surfaces

3) Excessive heating of the ~~Yankee~~yankee dryer shell during the installation and testing of the hot air hood. If the hot air hood will be generating air that is hotter than the ~~Yankee~~yankee dryer shell material’s maximum allowable working temperature (MAWT), then temperature sensors should be installed to monitor and record the ~~Yankee~~yankee dryer shell temperature during the hood testing; and

4) Impact load from improperly installed rolls, wires, nuts, dropped wrenches, etc., that may travel through the pressure roll nip causing external impact loads on the ~~Yankee~~yankee dryer shell.

~~h)~~i) If nonstandard ~~load~~ events (incidents) have occurred during installation, then the Inspector should ensure that an appropriate assessment of the structural integrity of the ~~Yankee~~yankee dryer has been performed. For additional details see ~~Yankee~~yankee dryer supplements in NBIC Part 2 and Part 3.

FIGURE S1.1



S1.3 DETERMINATION OF ALLOWABLE OPERATING PARAMETERS

a) A ~~Yankee~~yankee dryer is designed and intended to have its shell thickness reduced over the life of the vessel through routine wear and grinding ~~and machining.~~. The ~~Yankee~~yankee dryer shell is ground ~~or machined~~ on the outside surface to restore the quality or shape of the papermaking surface, essential to the manufacturing of tissue or other paper products.

b) Design documentation~~, called the "De-rate Curve,"~~ is required ~~and~~that dictates the maximum allowable operating parameters as shell thickness is reduced ~~(see NBIC Part 1, Figure S1.1).~~. Calculations~~,~~ used to determine those parameters~~,~~ are in accordance with ASME Code requirements for primary membrane stress ~~by the vessel manufacturer or~~and design criteria based ~~on~~upon other relevant stress categories~~,~~; (e.g., fatigue and maximum principal stress~~.~~). Calculation of these parameters requires that the respective stresses, resulting from the imposed loads, be compared to the appropriate material strength properties. Hence, knowledge of the applied stresses in the shell and the tensile and fatigue properties of the material are essential.

c) Yankee dryers are subjected to a variety of loads that create several categories of stress. Yankee dryers are designed such that the stress of greatest concern typically occurs on the outside surface at the axial centerline of the shell.

1) Steam Pressure Load — The internal steam pressure is one of the principal design loads applied to the ~~Yankee~~yankee dryer. The steam pressure expands the shell radially, causing a predominately circumferential membrane tensile stress. Because the shell is constrained radially by the heads at either end of the shell, the steam pressure also causes a primary bending stress in the vicinity of the head-to-shell joint. The ends of the shell are in tension on the inside and compression on the outside due to the steam pressure. The steam pressure also causes a bending stress in the heads.

2) Inertia Load — The rotation of the ~~Yankee~~yankee dryer causes a circumferential membrane stress in the shell similar to that caused by the steam pressure load. This stress is included in the design of the shell and increases with dryer diameter and speed.

3) Thermal Gradient Load — The wet sheet, applied to the shell, causes the outside surface to cool and creates a thermal gradient through the shell wall. This thermal gradient results in the outside surface being in tension and the inside surface in compression. With this cooling, the average shell temperature is less than the head temperature, which creates bending stresses on the ends

of the shell and in the heads. The ends of the shell are in tension on the outside and compression on the inside.

a. Other thermal ~~loadings~~loading also ~~occur~~occurs on a ~~Yankee~~yankee dryer. The use of full-width showers for a variety of papermaking purposes affects the shell similar to a wet sheet. The use of edge sprays ~~produce~~produces high bending stress in the ends of the shell due to the mechanical restraint of the heads.

b. Warm-up, cool-down, hot air impingement from the hood, moisture profiling devices, ~~fire fighting~~firefighting, and wash-up can all produce non-uniform thermal stresses in the pressure-~~retaining~~containing parts of the ~~Yankee~~yankee dryer. Heating or cooling different portions of the ~~Yankee~~yankee dryer at different rates causes these non-uniform stresses.

4) ~~Nip~~Line Load — The ~~nip~~line load from the contacting pressure roll(s) results in an alternating, high cycle, bending stress in the shell. This stress is greatest at the centerline of the shell. The load of the pressure roll deflects the shell radially inward causing a circumferential compressive stress on the outside surface and a tensile stress on the inside. Because the shell has been deflected inward at the pressure roll nip, it bulges outward about 30 degrees on each side of the nip. The outward bulge causes a tensile stress on the outside shell surface at that location and a corresponding compressive stress on the inside. Since the shell is passing under the pressure roll, its surface is subjected to an alternating load every revolution.

S1.4 ASME CODE PRIMARY MEMBRANE STRESS CRITERIA

a) Yankee dryers are typically designed and fabricated in accordance with ASME Section VIII, Division 1~~, The maximum allowable stress for cast iron is specified in UCI-23 and UG-22 of the ASME Code~~.

b) ASME Section VIII, Division 1, requires design stresses to be calculated such that any combination of loading expected to occur simultaneously during normal operation of the ~~Yankee~~yankee dryer will not result in a general primary stress exceeding the maximum allowable stress value of the material. In the ASME Code, the combination of loading resulting in the primary membrane stress in the shell is interpreted to be only composed of the circumferential stress from steam pressure. Sometimes, the stress from the inertial loading is included in this consideration.

c) In ASME Section VIII, Division 1, it is very important to note that no formulas are given for determining the stresses from thermal operating loads and pressure roll nip load(s). Hence, additional criteria need to be incorporated to establish the maximum allowable operating parameters of the ~~Yankee~~yankee dryer. Two such additional criteria are based upon the maximum principal and fatigue stress.

1) Maximum Principal Stress Criteria

The maximum principal stress in a ~~Yankee~~yankee dryer shell is the sum of the stresses that are simultaneously applied to the shell and is always aligned in the circumferential direction. The purpose of these criteria is to recognize the paper making application of the ~~Yankee~~yankee dryer and to prevent catastrophic failure by including all stresses. The ASME Code does not provide specific formulas for the full array of ~~Yankee~~yankee dryer shell stresses encountered in tissue making.

2) Fatigue Stress Criteria

Under normal operation, the stresses due to the steam pressure, inertial and thermal operating loads are considered to be steady-state stresses. When acting simultaneously, the sum of these stresses must be judged against the cyclic, or alternating, stress due to the pressure roll nip load. Fatigue stress criteria limit the alternating stress at a given mean stress using fatigue failure criteria~~ described by the Goodman or Smith Diagram.~~. The purpose of this limitation is to prevent

crack initiation in the outside wall due to the combination of stresses. As the thickness of the shell is reduced, one or more of these criteria will control the various operating parameters.

S1.5 PRESSURE TESTING

a) Water pressure testing in the field is not recommended because of the large size of ~~Yankee~~yankee dryers and the resulting combined weight of the ~~Yankee~~yankee dryer and the water used in the testing. This combined weight can lead to support structure overload. Several failures of ~~Yankee~~yankee dryers have occurred during field pressure testing using water. If this test must occur, the following review is recommended:

1) The testing area should be evaluated for maximum allowable loading, assuming the weight of the ~~Yankee~~yankee dryer, the weight of the water filling the ~~Yankee~~yankee dryer, and the weight of the support structure used to hold the ~~Yankee~~yankee dryer during the test; and

2) The manufacturer should be contacted to provide information on building the ~~Yankee~~yankee dryer support structure for the water pressure test. Typically, the ~~Yankee~~yankee dryer is supported on saddles that contact the ~~Yankee~~yankee dryer shell at each end near the head-to-shell joint. The manufacturer can provide information on saddle sizing and location so that the ~~Yankee~~yankee dryer is properly supported for the test.

b) When pressure testing is desired to evaluate the ~~Yankee~~yankee dryer for fitness for service, an alternative to water pressure testing is acoustic emission testing using steam or air pressure. Typically, the test pressure used is the operating pressure. Caution needs to be exercised to ensure personnel safety. Entry to the test area needs to be controlled and all personnel need to maintain a safe distance from the ~~Yankee~~yankee dryer during the test. The steam or air test pressure should never exceed the maximum allowable working pressure (MAWP) of the ~~Yankee~~yankee dryer.

S1.6 NONDESTRUCTIVE EXAMINATION

a) Nondestructive examination (NDE) methods should be implemented by individuals qualified and experienced with the material to be tested using written NDE procedures. ~~For Yankee dryers, cast iron knowledge and experience are essential.~~

b) Typical nondestructive examination methods should be employed to determine indication length, depth, and orientation (sizing) of discontinuities in ~~Yankee~~yankee dryers. Magnetic Particle, specifically the wet fluorescent method, and Dye Penetrant methods are applicable in the evaluation of surface-breaking indications. Ultrasound testing is the standard method for evaluation of surface-breaking and embedded indications. Radiographic methods are useful in the evaluation of embedded indications. Acoustic ~~Emmission~~Emission Testing can be used to locate and determine if a linear indication is active, e.g., propagating crack. Metallographic Analysis is useful in differentiating between original casting discontinuities and cracks.

c) When nondestructive testing produces an indication, the indication is subject to interpretation as false, relevant, or nonrelevant. If it has been interpreted as relevant, the necessary subsequent evaluation will result in a decision to accept, repair, replace, monitor, or adjust the maximum allowable operating parameters.

Item 22-23

Subject: Removing Section 8 from all 4 Parts of the NBIC

Explanation of Need: The current wording in Section 8 is obsolete and the actual process for submitting Interpretations, Code Revisions, and Code Additions is now located in the Introduction of the NBIC.

Project Manager: Gary Scribner

Proposed Change:

All text in Section 8 will be deleted and replaced with the following:

The process for submitting Interpretations, Code Revisions, and Code Additions has been moved to the Introduction of this book.