

Date Distributed:



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

# **NATIONAL BOARD SUBGROUP INSPECTION**

## **AGENDA**

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Meeting of July 14<sup>th</sup>, 2020  
Louisville, KY

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

## **1. Call to Order**

8:00 AM

## **2. Introduction of Members and Visitors**

## **3. Check for a Quorum**

## **4. Awards/Special Recognition**

## **5. Announcements**

The National Board will be hosting a reception for all committee members and visitors on Wednesday evening at 5:30pm at the SKY Grand Terrace on the 16<sup>th</sup> floor of The Brown Hotel.

## **6. Adoption of the Agenda**

## **7. Approval of the Minutes of the January 14<sup>th</sup>, 2020 Meeting**

The minutes are available for review on the National Board website, [www.nationalboard.org](http://www.nationalboard.org).

## **8. Review of Rosters (Attachment Page 1)**

### **a. Membership Nominations**

- i. Mr. Brent Ray (Users) is interested in becoming a member of SG Inspection.

### **b. Membership Reappointments**

The following Subgroup Inspection memberships are set to expire prior to the January 2021 meeting:

- Mr. Donnie LeSage
- Mr. James Roberts
- Mr. Jason Safarz

### **c. Officer Appointments**

## **9. Open PRD Items Related to Inspection**

- NB14-0602B – Improve index in Part 2 relating to pressure relief devices – D. Marek (PM)
  - Update: Work is still being done for this item.
- NB15-0321 – Review testing requirements for inservice testing of pressure relief devices in Part 2, 2.5.7 a) – A. Renaldo (PM)
  - Update: Proposal was balloted to Main Committee and received a few negative votes. Further work is being done to address those comments.

## **10. Interpretations**

There are no Interpretations for the Subgroup Inspection.

## 11. Action Items

Item Number: 18-43	NBIC Location: Part 2, Section 5	Attachment Pages 2-4
<p><b>General Description:</b> Permanent nameplate removal from pressure vessel being removed from service</p> <p><b>Subgroup:</b> Inspection</p> <p><b>Task Group:</b> J. Roberts (PM), J. Burgess, J. Calvert, T. Shernisky, J. Clark, M. Sansone</p> <p><b>January 2020 Meeting Action:</b> The group has reviewed this interpretation, and Mr. Gary Scribner explained that he believes this should only be an interpretation for Part 3. A motion was made to close this item from the SG Inspection Agenda and allow Part 3 to respond. The motion was seconded and unanimously approved.</p> <p><b>Update:</b> This item was balloted to Main Committee and received several comments to be addressed by the task group.</p>		

Item Number: 18-62	NBIC Location: Part 2, 4.2.1	Attachment Pages 5-6
<p><b>General Description:</b> Remote Inspection of Confined Space Requirements</p> <p><b>Subgroup:</b> Inspection</p> <p><b>Task Group:</b> V. Newton (PM), M. Horbaczewski, B. Wilson, J. Calvert, J. Castle, D. Graf, T. Shernisky</p> <p><b>January 2020 Meeting Action:</b> Progress Report: Mr. Newton stated they will be putting a proposal together &amp; try to letter ballot it to SG Inspection and SC Inspection prior to the July 2020 meeting.</p>		

Item Number: 18-63	NBIC Location: Part 2	No Attachment
<p><b>General Description:</b> Review inspection requirements for pressure vessels designed for high pressures</p> <p><b>Subgroup:</b> Inspection</p> <p><b>Task Group:</b> T. Shernisky (PM), J. Mangas, J. Peterson, V. Scarcella, and J. Castle</p> <p><b>January 2020 Meeting Action:</b> Progress Report: Mr. Petersen spoke to the subgroup to let them know where they are on this item. HE asked for some comments and input from the group. The task group will take the comments and input from the group to continue to work on their proposal.</p>		

Item Number: 19-6	NBIC Location: Part 2, 2.3.6.8	No Attachment
<p><b>General Description:</b> PVHO 2.3.6.8 Add other types of PVHO's</p> <p><b>Subgroup:</b> Inspection</p> <p><b>Task Group:</b> D. Buechel (PM), R. Smith, S. Reimers, M. Sansone, D. LeSage, R. Reimers</p> <p><b>Explanation of Need:</b> Currently part 2 only covers medical PVHO's.</p> <p><b>January 2020 Meeting Action:</b> Progress Report: Mr. Buechel stated he has tried to contact the other task group members without luck. A new task group has been formed for this item. They will work together to create a proposal.</p>		

<b>Item Number: 19-7</b>	<b>NBIC Location: Part 2</b>	<b>Attachment Page 7</b>
<b>General Description:</b> Pressure Gage Graduation  <b>Subgroup:</b> Inspection  <b>Task Group:</b> V. Newton (PM), D. Buechel, D. Rose, D. Graff, & J. Clark  <b>Explanation of Need:</b> This item was opened after discussion of the pressure gage for PVHO's. The SG Inspection decided they needed to look into the pressure gage graduation for other pressure retaining items beyond PVHO's.  <b>January 2020 Meeting Action:</b> Progress Report: Mr. Buechel stated the task group is still working on the proposal.		

<b>Item Number: 19-46</b>	<b>NBIC Location: Part 2, S5.1</b>	<b>No Attachment</b>
<b>General Description:</b> Revisions to Yankee dryer supplement in Part 2 (Scope)  <b>Subgroup:</b> Inspection  <b>Task Group:</b> V. Newton (PM), T. Barker, D. Lesage, J. Jessick  <b>Explanation of Need:</b> Ensure that wording in Part 2, S5.1, is identical to that found in Part 1, S1.1.  <b>January 2020 Meeting Action:</b> Progress Report: Mr. Newton stated there has been no progress on this item.		

<b>Item Number: 19-63</b>	<b>NBIC Location: Part 2, S5.2</b>	<b>No Attachment</b>
<b>General Description:</b> Changes to the Yankee Dryer Supplement (ASSESSMENT OF INSTALLATION)  <b>Subgroup:</b> Inspection  <b>Task Group:</b> V. Newton (PM), T. Barker, D. Lesage, J. Jessick  <b>Explanation of Need:</b> Ensure that wording in Part 2, S5.2, is identical to that found in Part 1, S1.2. Note that wording will be the same, but paragraph numberings will be different.  <b>January 2020 Meeting Action:</b> A task group was assigned. This group will work with Part 1 to make sure the paragraph "ASSESSMENT OF INSTALLATION", in the supplements on Yankee Dryers in Part 1 and Part 2 both read the same.		

<b>Item Number: 19-64</b>	<b>NBIC Location: Part 2, S5.2.1</b>	<b>No Attachment</b>
<b>General Description:</b> Changes to the Yankee Dryer Supplement (DETERMINATION OF ALLOWABLE OPERATING PARAMETERS)  <b>Subgroup:</b> Inspection  <b>Task Group:</b> V. Newton (PM), T. Barker, D. LeSage, J. Jessick  <b>Explanation of Need:</b> Ensure that wording in Part 2, S5.2.1, is identical to that found in Part 1, S1.3. Note that wording will be the same, but paragraph numberings will be different.  <b>January 2020 Meeting Action:</b> Progress Report: Mr. Newton stated there has been no progress on this item.		

<b>Item Number: 19-88</b>	<b>NBIC Location: Part 2, 2.2.12.7 c) 2)</b>	<b>Attachment Page 8</b>
<p><b>General Description:</b> At NBIC Part II propose the following be added to Thermal Fluid Heater</p> <p><b>Subgroup:</b> Inspection</p> <p><b>Task Group:</b> V. Scarcella (PM), M. Sansone, &amp; T. Bolden</p> <p><b>Explanation of Need:</b> These items are essential to preventing catastrophic loss and are low cost items.</p> <p><b>January 2020 Meeting Action:</b> Mr. Scarcella presented this item to the subgroup along with a proposal. The subgroup discussed the changes, and decided to create a task group to work on the proposal further.</p>		

**New Items:**

<b>Item Number: 20-5</b>	<b>NBIC Location: Part 2, 4.1 – 4.4</b>	<b>No Attachment</b>
<p><b>General Description:</b> Add language in NBIC Pt2/Pt3 to minimize CSEs by allowing remote NDE.</p> <p><b>Subgroup:</b> Inspection</p> <p><b>Task Group:</b> None assigned</p> <p><b>Explanation of Need:</b> In order to minimize higher-risk work, specifically Confined Space Entries, remote NDE methodologies should be specifically allowed by the NBIC, at the discretion of the people performing the inspections.</p>		

<b>Item Number: 20-9</b>	<b>NBIC Location: Part 2, 9.1</b>	<b>See attachment on the cloud</b>
<p><b>General Description:</b> Define "Verify" in the NBIC Glossary</p> <p><b>Subgroup:</b> Repairs and Alterations</p> <p><b>Task Group:</b> N. Carter (PM)</p> <p><b>Explanation of Need:</b> Defining "Verify" in the NBIC Part 1, 2, 3, and 4 to align with the definition in NB-263, RCI-1, Rules for Commissioned Inspectors.</p>		

<b>Item Number: 20-46</b>	<b>NBIC Location: Part 2, 5.3.2</b>	<b>No Attachment</b>
<p><b>General Description:</b> Updates to Forms NB-5, NB-6, &amp; NB-7.</p> <p><b>Subgroup:</b> Inspection</p> <p><b>Task Group:</b> None assigned</p> <p><b>Explanation of Need:</b> On the current forms NB-5, NB-6, &amp; NB-7 there are fields that are already on the ASME Manufactures Data Report making them repetitive. Other fields that ask for in- depth technical information would be hard if not impossible for an inspector to determine and are irrelevant to the inspection process.</p>		

## **12. Future Meetings**

January 11<sup>th</sup> – 14<sup>th</sup>, 2021 – New Orleans, LA

July 12<sup>th</sup> – 15<sup>th</sup>, 2021 – Cincinnati, OH

## **13. Adjournment**

Respectfully submitted,

*Jonathan Ellis*

Jonathan Ellis  
NBIC Secretary

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 Subgroup Inspection

Last Name	First Name	Interest Category	Role	Exp. Date	More
Graf	Darrell	National Board Certificate Holders	Chair	08/30/2021	<a href="#">Details</a>
Getter	Jim	Manufacturers	Vice Chair	08/30/2021	<a href="#">Details</a>
Metzmaier	Jodi		Secretary	01/30/2099	<a href="#">Details</a>
Barker	Timothy	Authorized Inspection Agencies	Member	01/30/2021	<a href="#">Details</a>
Brantley	Ernest	Authorized Inspection Agencies	Member	07/30/2022	<a href="#">Details</a>
Buechel	David	Authorized Inspection Agencies	Member	07/30/2022	<a href="#">Details</a>
Calvert	James	National Board Certificate Holders	Member	08/30/2021	<a href="#">Details</a>
Clark	James	Manufacturers	Member	10/30/2022	<a href="#">Details</a>
Horbaczewski	Mark	Users	Member	08/30/2021	<a href="#">Details</a>
LeSage	Donnie	Jurisdictional Authorities	Member	07/30/2020	<a href="#">Details</a>
Mangas	John	General Interest	Member	08/30/2021	<a href="#">Details</a>
Newton	Venus	Authorized Inspection Agencies	Member	01/30/2022	<a href="#">Details</a>
Petersen	Jeffrey	Users	Member	01/30/2023	<a href="#">Details</a>
Roberts	James	Manufacturers	Member	08/30/2020	<a href="#">Details</a>
Rose	David	Users	Member	10/30/2022	<a href="#">Details</a>
Safarz	Jason	General Interest	Member	07/30/2020	<a href="#">Details</a>
Sansone	Matthew	Jurisdictional Authorities	Member	01/30/2021	<a href="#">Details</a>
Scarcella	Vincent	Authorized Inspection Agencies	Member	01/30/2023	<a href="#">Details</a>
Vandini	Thomas	National Board Certificate Holders	Member	01/30/2023	<a href="#">Details</a>
Welch	Paul	Authorized Inspection Agencies	Member	01/30/2022	<a href="#">Details</a>

## 1.6 CHANGE OF SERVICE

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

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

## 1.7 SCRAPPING PRESSURE RETAINING ITEMS

The owner or user shall deface the code nameplate(s) of any pressure retaining item that is scrapped. The removal or defacement of the Code nameplate(s) should be verified by the Inspector, and the National Board form NB-XXX shall be completed and submitted to the National Board and Jurisdiction, if required.

### ADD DEFINITION:

SCRAPPED – Permanent removal from service by owner's or user's procedures.

**Scrapping of Pressure Retaining Items**  
In accordance with provisions of the National Board Inspection Code

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**1.Submitted to:**

\_\_\_\_\_  
Name of Jurisdiction

\_\_\_\_\_  
Address

\_\_\_\_\_  
Phone Number

**2. Submitted by:**

\_\_\_\_\_  
(Name of Owner/User)

\_\_\_\_\_  
Address

\_\_\_\_\_  
Phone Number

**3. Manufactured by:**  
(name and address)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**4. Location of Installation:**  
(address)

\_\_\_\_\_  
\_\_\_\_\_

**5. Manufacturer's Data Report:**

☐ YES ☐ NO

**6. Item Registered with National Board:**

☐ YES ☐ NO

NB Number: \_\_\_\_\_

**7. Item Identification:**

Year Built: \_\_\_\_\_

Mfr. Serial No.: \_\_\_\_\_

Type: \_\_\_\_\_

Jurisdiction no.: \_\_\_\_\_

Dimensions: \_\_\_\_\_

MAWP: \_\_\_\_\_

**8. Date of removal or defacement of the Code nameplate(s)** \_\_\_\_\_

**9. I certify that to the best of my knowledge and belief the statements in this report are correct, and with provisions of the National Board Inspection Code.**

Name of Owner or User: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Instructions for Completing the Form NB-XXX, Scrapping of Pressure Retaining Items Form**

Items 1-9 shall be completed by the owner, user, or "R" Stamp Holder making the request.

- 1) The name, address, and phone number of the Jurisdiction, Authorized Inspection Agency (when there is no Jurisdiction) the form is being submitted to for approval.
- 2) Enter the name and address of your company or organization.
- 3) Enter the name and address of the manufacturer shown on the name plate.
- 4) Enter the name and address of the location where the pressure-retaining item is installed. If this is the same as number 2, check the box "same as # 4."
- 5) Manufacturer's Data Report Attached-check the appropriate box.
- 6) Is the pressure-retaining item registered with the National Board? Check the appropriate box. If yes, provide the National Board Registration Number.
- 7) Provide as much information as known to help identify the pressure-retaining item.
- 8) Enter date the removal or defacement of the Code nameplate.
- 9) Enter the name and signature of the owner, user, or "R" Stamp Holder (and "R" Stamp number if applicable).

Note: Once completed the requester shall file a copy with the Jurisdiction where the pressure retaining item is installed, the National Board (if registered with the National Board), and the owner or user of the vessel if the request was made by an "R" Stamp Holder, and upon request to the Authorized Inspection Agency who witnessed the removal or defacement of the nameplate.

### 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.

## PART 2, SECTION 4 INSPECTION — EXAMINATIONS, TEST METHODS, AND EVALUATIONS

### 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.~~
- c) 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.
  - i) For Remote Visual Inspection, plans are reviewed and approved by the Inspector.
  - ii) The Inspector shall be present at time of data collection.
  - iii) 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.
  - iv) The Inspector shall have direct communication with the operator of the remote visual camera.
  - v) 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.
  - vi) 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" simulated defect identification
    - b. Minimum light intensity of 100 fc
    - c. Not less than 30deg offset to the surface to be examined
    - d. Resolution at least equal to that obtainable by direct observation

### 2.3.6.5 INSPECTION OF PRESSURE VESSELS FOR HUMAN OCCUPANCY (PVHO'S)

d) Inspection of parts and appurtenances (e.g., piping systems, pressure gage, bottom drain)

- 1) As stated above, cast iron is not allowed on PVHOs and shall be replaced with parts fabricated with other suitable materials, in accordance with ASME Code Section II.
- 2) If valves or fittings are in place, check to ensure that these are complete and functional.
- 3) The Inspector shall note the pressure indicated by the gage and compare it with other gages on the same system. If the pressure gage is not mounted on the vessel itself, it should be ascertained that the gage is installed on the system in such a manner that it correctly indicates actual pressure in the vessel. Lines leading to chamber primary depth gages should connect only to the depth gage.
- 4) The Inspector shall verify that the vessel is provided with a drain opening.
- 5) The system should have a pressure gage designed for ~~at least~~ the most severe condition of ~~coincident~~ pressure in normal operation. This gage should be clearly visible to the person adjusting the setting of the pressure control valve. The graduation on the pressure gage shall be graduated to not less than 1.5 times the pressure at which the lowest safety/relief valve is set. ~~MAWP of the vessel.~~
- 6) Provisions should be made to calibrate pressure gages or to have them checked against a standard test gage.
- 7) Any vents and exhausts should be piped at least 10 ft. (3.0 m) from any air intake.
- 8) Low points should be fitted with drains.

## 2.2.12.7 THERMAL FLUID HEATERS

### a) Design and Operating Features

- 1) Many thermal fluid heaters are pressure vessels in which a synthetic or organic fluid is heated or vaporized. Some thermal fluid heaters operate at atmospheric pressure. The fluids are typically flammable, are heated above the liquid flash point, and may be heated above the liquid boiling point. The heaters are commonly direct-fired by combustion of a fuel or by electric resistance elements. Heater design may be similar to an electric resistance heated boiler, to a firetube boiler or, more commonly, to a watertube boiler. Depending on process heating requirements, the fluid may be vaporized with a natural circulation, but more often, the fluid is heated and circulated by pumping the liquid. Use of thermal fluid heating permits heating at a high temperature with a low system pressure (600°F to 700°F [316°C to 371°C] at pressures just above atmospheric). To heat water to those temperatures would require pressures of at least 1,530 psig (10.6 MPa).
- 2) Nearly all thermal heating fluids are flammable. Leaks within a fired heater can result in destruction of the heater. Leaks in external piping can result in fire and may result in an explosion. Water accumulation in a thermal heating system may cause upsets and possible fluid release from the system if the water contacts heated fluid (remember, flashing water expands approximately 1,600 times). It is essential for safe system operation to have installed and to maintain appropriate fluid level, temperature and flow controls for liquid systems, and level, temperature, and pressure controls for vapor systems. Expansion tanks used in thermal heater systems, including vented systems, should be designed and constructed to a recognized standard such as ASME Section VIII, Div. 1, to withstand pressure surges that may occur during process upsets. This is due to the rapid expansion of water exceeding the venting capability.
- ~~3) 3)~~ Because heat transfer fluids contract and become more viscous when cooled, proper controls and expansion tank venting are required to prevent low fluid level and collapse of the tank. Some commonly used fluids will solidify at temperatures as high as 54°F (12°C). Others do not become solid until -40°F (-40°C) or even lower. The fluids that become viscous will also become difficult to pump when cooled. Increased viscosity could cause low flow rates through the heater. The heater manufacturer recommendations and the fluid manufacturer's Material Safety Data Sheets (MSDS) should be reviewed for heat tracing requirements.
- 4) It is recommended that thermal fluid heaters have stack gas temperature indicators, alarms and safety shut down devices. Stack gas temperatures must be monitored daily while in operation.

### b) Industrial Applications

Thermal fluid heaters, often called boilers, are used in a variety of industrial applications such as solid wood products manufacturing, resins, turpentines, and various types of chemicals, drugs, plastics, corrugating plants, and wherever high temperatures are required. They are also frequently found in asphalt plants for heating of oils,

tars, asphalt pitches, and other viscous materials. Many chemical plants use this type of heater in jacketed reactors or other types of heat exchangers.

c) **Inspection**

~~1) Inspection of thermal fluid heaters typically is done in either the operating mode or the shutdown mode. Internal inspections, however, are rarely possible due to the characteristics of the fluids and the need to drain and store the fluid. Reliable and safe operation of a heater requires frequent analysis of the fluid to determine that its condition is satisfactory for continued operation. If the fluid begins to break down, carbon will form and collect on heat transfer surfaces within the heater. Over-heating and pressure boundary failure may result. Review of fluid test results and control and safety device maintenance records are essential in determining satisfactory conditions for continued safe heater operation.~~

2)1) Due to the unique design and material considerations of thermal fluid heaters and vaporizers, common areas of inspection are:

- a. Design — Specific requirements outlined in construction codes must be met. Some jurisdictions may require ASME Section I or Section VIII construction. Code requirements for the particular Jurisdiction should be reviewed for specific design criteria;
- b. Materials — For some thermal fluids, the use of aluminum or zinc anywhere in the system is not advisable. Aluminum acts as a catalyst that will hasten decomposition of the fluid. In addition, some fluids when hot will cause aluminum to corrode rapidly or will dissolve zinc. The zinc will then form a precipitate that can cause localized corrosion or plug instrumentation, valves, or even piping in extreme cases. These fluids should not be used in systems containing aluminum or galvanized pipe. The fluid specifications will list such restrictions;

**Note:** Some manufacturers of these fluids recommend not using aluminum paint on valves or fittings in the heat transfer system.

- c. Corrosion — When used in applications and installations recommended by fluid manufacturer, heat transfer fluids are typically noncorrosive. However, some fluids, if used at temperatures above 150°F (65°C) in systems containing aluminum or zinc, can cause rapid corrosion;
- d. Leakage — Any sign of leakage could signify problems since the fluid or its vapors can be hazardous as well as flammable. Areas for potential leaks include cracks at weld attachment

points and tube thinning in areas where tubes are near soot blowers. The thermal fluid manufacturer specifications will list the potential hazards;

- e. Solidification of the fluid — Determine that no conditions exist that would allow solidification of the thermal fluid. When heat tracing or insulation on piping is recommended by the heater manufacturer, the heat tracing and insulation should be checked for proper operation and installation;
- f. Pressure relief devices — Pressure relief valves shall be a closed bonnet design with no manual lift lever. Pressure relief valves must be tested by a qualified repair concern every 36 months unless otherwise directed by the jurisdiction. The pressure relief discharge should be connected to a closed, vented storage tank or blowdown tank with solid piping (no drip pan elbow or other air gap). When outdoor discharge is used, the following should be considered for discharge piping at the point of discharge:
  - 1. Both thermal and chemical reactions (personnel hazard);
  - 2. Combustible materials (fire hazard);
  - 3. Surface drains (pollution and fire hazard);
  - 4. Loop seal or rain cap on the discharge (keep both air and water out of the system);
  - 5. Drip leg near device (prevent liquid collection); and
  - 6. Heat tracing for systems using

#### g. Inspections

In addition to the requirements set down in this part for the type of construction, inspections of thermal fluid heaters shall include verifying that fluid testing is conducted annually and that results are compared to the fluid manufacturer's standard. The inspector shall also verify the documentation of annual testing of controls and safety devices. For those types of construction where the boiler internal cannot be completed on the fluid side a borescope or other suitable device should be used to ascertain conditions to the extent possible.