THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

Date Distributed:

SUBGROUP ON PRESSURE VESSEL AND PIPING

Minutes

Meeting of January 15, 2013
Mobile, Alabama

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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 –**

   Chairman, Mr. G. Scribner called the meeting to order at 1:12 p.m.

2. **Announcements**

   Wednesday, January 16, 2013 – Continental Breakfast at 7:00 a.m. to 8:00 a.m. (guests included) in the Mobile Bay Foyer and USS Alabama Tour & Reception from 6:00 p.m. to 9:00 p.m. The reception will be held in the ship's Ward Room. Transportation by bus has been arranged to and from the ship. All (guests included) interested in attending must meet in the hotel lobby at 5:30 p.m. to board the bus going to and boarding to return at 8:45 p.m. 9:00 p.m. at the latest.

   Thursday, January 17, 2013 – Breakfast Buffet at 6:30 a.m. to 8:00 a.m. and Lunch Buffet at 11:30 a.m. to 12:30 p.m. (guests included) in the Schooner room.

3. **Adoption of the Agenda**

   There was a motion to adopt the agenda as published. The motion was unanimously approved.

4. **Approval of Minutes of July 17, 2012 meeting**

   There was a motion to approve the agenda as published. The motion was unanimously approved.

5. **Review of the Roster (Attachment 1, page 4-5)**

   There was a motion to approve the roster as published. The motion was unanimously approved.

6. **Action Items (Attachment 2-3, pages 6-20)**

   NB10-0201 ***Part 1 S3 SG on Pressure Vessels and Piping*** – Expand the section on installation of thermal fluid heaters. This action item is a result of splitting NB09-0501into two parts. A task group of D. Patten (Project Manager), M. Wadkinson, G. Halley, G. Scribner and P. Bourgeois has been assigned. (Attachment 2, page 6-19)

   January 2013
   D. Patten and M. Wadkinson presented a handout of proposed text for Part 1, Section 6 – Supplements. The committee reviewed and shared their feedback to include editorial additions, deletions, rewording and safety concerns. The TG will revise the document and will send out as letter ballot before the next meeting.

   NB11-2001 ***Part 1, 2.9.4 SG on Pressure Vessels and Piping*** – Address the safe venting of isolatable economizers where the outlet is below the inlet of other communicable chambers (headers, drums, etc.). (Attachment 3, page 20)

   January 2013
   Mr. Patten presented a progress report. As of the July 2012 MC meeting, this item was letter balloted but the ballot was withdrawn before it closed due to the negative comments received. The negative votes were submitted to the SC and it was decided that there was no need for a wording change and it was unanimously approved to reaffirm this item. Mr. Richards made a motion to re-ballot the item to the NBIC Committee. In August 2012 Mr. Patten submitted a request for interpretation to ASME for their input so as to avoid any potential conflicts with ASME. An ASME number of 12-1509 has been assigned and Mr. Patten feels that this item is not ready for re-ballot until this interpretation is received back from ASME. As of the SG PVP January 2013 meeting no response from ASME has been received.

NB12-0302 ***Part 1 SG on Pressure Vessels and Piping*** – Define installation requirements for (PVHO) hyperbaric chambers) This action item is a result of splitting NB09-0601into two parts. A task group of G. Scribner (Project Manager), M. Richards and B. Moore has been assigned.
(No Attachment)

January 2013
Mr. Scribner presented a progress report. Part 2 has been and continues working on this with several conversations having took place. ASME standards have revealed a number of additional needs in specific areas such as, single chamber, multi-chamber, animals, etc. In addition, there is a belief that there should be a specific endorsement for an individual to sign off on these devices. This is being further investigated with NBIC. The direction is to define the different types of PVHO's by letter ballot before the next meeting. The TG will work with PVHO to come up with definitions. Mr. Brian Moore has been added to the TG.

9. New Business

No new business

10. Future Meetings

January 13-16, 2014, San Antonio, Texas

Three locations have been selected by committee members for the January 2015 meeting being either Orlando, FL; San Diego, CA; or Phoenix/Tucson, AZ. These locations will be submitted to the NBIC Committee for final approval of one location.

11. Adjournment

The meeting adjourned at 2:17 p.m.

Respectfully Submitted,

Jeanne Bock
Secretary

Attendance List PV and Piping Subgroup

Meeting Date: January 15, 2013

Harold Tyndall Zurich Services Corporation Risk Engineering 770 Corbett Street Winterville, NC 28590 Ph: 252-215-1144 Fax: E-mail: **Harold.tyndall@zurichna.com**	Attended: Yes ☒ No ☐ HGT *Initial*	**Jeanne Bock** National Board 1055 Crupper Ave. Columbus, OH 43229 Ph: 614-888-8320 F: 614-847-1828 E: jbock@nationalboard.org	Attended: Yes ☑ No ☐ *Initial*
Geoffrey Halley ABMA 1315 Ridge Road Wildwood, MO 63021 Ph: 636-394-3483 Fax: 636-527-2839 Email: ghalleysji@aol.com	Attended: Yes ☒ No ☐ *Initial*	**Raymond Snyder** 150 Costa Loop Auburndale, FL 33823 Cell- 863-956-7939 Ph:865-965-4417 Fax: ~~865-967-0185~~ None. E-mail: Raymond.snyder@ariseinc.com	Attended: Yes ☒ No ☐ *Initial*
H. Michael Richards Southern Company 42 Inverness Center Pkwy. Birmingham, AL 35242 Ph: 205-992-7111 Fax: 205-992-0361 E-mail: hmrichar@southernco.com	Attended: Yes ☑ No ☐ *Initial*	**Gary Scribner** Missouri Division of Fire Safety P.O. Box 844 Jefferson City, MO 65102 Ph: 573-751-8708 Fax: 573-526-5971 E-mail: gary.scribner@dfs.mo.gov	Attended: Yes ☐ No ☐ *Initial*
Paul Bourgeois Traveler's ~~11441 Sarasota Lane~~ 6812 5th ST Northport, AL ~~35475~~ 35476 Ph:205-339-6314 Fax: 888-803-1522 Email: pcbourge@travelers.com	Attended: Yes ☒ No ☐ PCB *Initial*	**Stanley Konopacki** Midwest Generation 235 Remington Blvd. Suite A Bolingbrook, IL 60440 Ph: 847-599-2243 Fax: 847-599-2256 Email: SKonopacki@MWGen.com	Attended: Yes ☒ No ☐ SCK *Initial*

Attendance List PV and Piping Subgroup

Meeting Date: January 15, 2013

Donald Patten R.F. MacDonald Co. 25920 Eden Landing Road Hayward, CA 94545 P: 510-570-7422 F: 510-784-1004 Email: don.patten@rfmacdonald.com	Attended: Yes ☑ No ☐ D.P. *Initial*	**Melissa Wadkinson** Fulton Companies 912 Centerville Road PO Box 257 Polaski, NY 13142 P: 315-298-7112 Fax: Email: Melissa.wadkinson@fulton.com	Attended: Yes ☑ No ☐ MW *Initial*
Name: CRAIG HOPKINS Company: SEATTLE BOILER Address: City/State/Zip: Ph: Ext. Fax: E-mail:	CH	Name: Company: Address: City/State/Zip: Ph: Ext. Fax: E-mail:	
Name: Paul Schuelke Company: Weil-McLain Address: Same City/State/Zip: Ph: Ext. Fax: E-mail:		Name: Company: Address: City/State/Zip: Ph: Ext. Fax: E-mail:	
Name: Company: Address: City/State/Zip: Ph: Ext. Fax: E-mail:		Name: Company: Address: City/State/Zip: Ph: Ext. Fax: E-mail:	

National Board Inspection Code
Subcommittee Installation
Subgroup on Pressure Vessels and Piping

NB10-0201

Members:

Donald Patten
Stan Konopacki
Gary Scribner
Melissa Wadkinson

Task Group Assignment

Address Thermal Fluid Heater Installation

Source

PR 07 – 2102

Proposal

Insert the following text as Part 1, Section 6 Installation – Supplements

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Proposed Text

PART 1, SECTION 6
SUPPLEMENT 4
INSTALLATION OF THERMAL FLUID HEATERS

S4.1 SCOPE

This Supplement describes guidelines for the installation of a Thermal Fluid Heater. A Thermal Fluid Heater System consists of the Heater, Expansion Tank, Circulating Pump with the proper Piping and Controls to heat jacketed kettles, presses, reactors, ovens, exchangers, etc.

S4.2 DEFINITION

A thermal fluid heater is a closed loop liquid phase heater (flooded pressure vessel) in which the heat transfer media is heated but no vaporization takes place within the vessel. Depending on the fluid selection and operating parameters, systems may be open or closed to the atmosphere. Closed systems may be pressurized with an inert gas blanket.

A thermal fluid vaporizer is a heater in which the thermal fluid is vaporized within the pressure vessel.

Thermal fluid: A fluid (other than water) that is chemically stable over a large temperature range and is specifically designed for use as a heat transfer medium.

S4.3 General Requirements

S4.3.1 Supports, Foundations, and Settings

Each thermal fluid heater and its associated piping must be safely supported. Design of supports, foundations, and settings shall consider vibration (including seismic where necessary), movement (including thermal movement), and loadings (including the weight of the fluid in the system) in accordance with jurisdictional requirements, manufacturer’s recommendations, and/or other industry standards, as applicable.

S4.3.2 STRUCTURAL STEEL

a) If the thermal fluid heater is supported by structural steel work, the steel supporting members shall be so located or insulated that the heat from the furnace will not affect their strength.

b) Structural steel shall be installed in accordance with jurisdictional requirements, manufacturer’s recommendations, and/or other industry standards, as applicable

S4.3.3 SETTINGS

The thermal fluid heater must be installed on a level, hard, non-combustible surface preferably of concrete to protect against any fire hazard. A 4” containment curb or 2” steel welded drip lip around the thermal fluid heater equipment skid shall be provided.

S4.3.4 CLEARANCES

a) Thermal fluid heater installations shall allow for normal operation, maintenance, and inspections. There shall be at least 36 in. (915 mm) of clearance on each side of the thermal fluid heater to enable access for maintenance and/or inspection activities. Thermal fluid heaters operated in battery shall not be installed closer than 48 in. (1220 mm) from each other. The front or rear of any thermal fluid heater shall not be located nearer than 36 in. (915 mm) from any wall or structure. Alternative clearances in accordance with the manufacturer's recommendations are subject to acceptance by the Jurisdiction.

S.4.4 THERMAL FLUID HEATER ROOM REQUIREMENTS

S.4.4.1 EXIT

Two means of exit shall be provided for thermal fluid heater rooms exceeding 500 sq. ft. (46.5 sq. m) floor area and containing one or more thermal fluid heaters or boilers having a combined fuel capacity of 1,000,000 Btu/hr (293 kW) or more. Each elevation shall be provided with at least two means of exit, each to be remotely located from the other. A platform at the top of a single thermal fluid heater is not considered an elevation.

S.4.4.2 LADDERS AND RUNWAYS

a) All walkways, runways, and platforms shall be:

1) of metal construction;

2) provided between or over the top of boilers that are more than 8 ft. (2.4 m) above the operating floor to afford accessibility for normal operation, maintenance, and inspection;

3) constructed of safety treads, standard grating, or similar material and have a minimum width of 30 in. (760 mm);

4) of bolted, welded, or riveted construction;

5) equipped with handrails 42 in. (1070 mm) high with an intermediate rail and 4 in. (100 mm) toe-board.

b) Stairways that serve as a means of access to walkways, runways, or platforms shall not exceed an angle of 45 degrees from the horizontal and be equipped with handrails 42 in. (1070 mm) high with an intermediate grid.

c) Ladders that serve as a means of access to walkways, runways, or platforms shall:

1) be of metal construction and not less than 18 in. (460 mm) wide;

2) have rungs that extend through the side members and are permanently secured;

3) have a clearance of not less than 30 in. (760 mm) from the front of rungs to the nearest permanent object on the climbing side of the ladder;

4) have a clearance of not less than 6-1/2 in. (165 mm) from the back of rungs to the nearest permanent object;

5) have a clearance width of at least 15 in. (380 mm) from the center of the ladder on either side across the front of the ladder.

d) There shall be at least two permanently installed means of exit from walkways, runways, or platforms that exceed 6 ft. (1.8m) in length.

S4.5 SOURCE REQUIREMENTS

S4.5.1 THERMAL LIQUIDS (HEAT TRANSFER FLUIDS)

It is extremely important that the proper heat transfer fluid be selected by competent personnel knowledgeable of the system. Heat transfer fluids should meet the following basic requirements:

a) Resist deterioration at the temperatures involved, to assure long useful life and a clean system.
b) Possess good heat transfer characteristics.
c) Have low vapor pressures at operating temperatures, to permit operation at moderate pressures. Note: Processes requiring thermal fluid temperatures higher than 650F will require the use of specialty fluids with high vapor pressures (150 psi). These fluids also tend to have special environmental, safety and health considerations.
d) Have low viscosities to decrease pumping losses (due to pipe friction) and the power required for circulation.
e) Be suitable for outside temperatures involved to prevent freeze up unless a means of heat trace has been implemented
f) Meet Environmental Regulations.

The heat transfer fluid must be kept clean and in proper condition. Tests should be made periodically to determine the condition of the fluid and for recommendations by the fluid manufacturer. Any heat transfer fluid that is added must be clean and of the proper specification and added at a temperature below 200 Deg. F at the low point in the system. Fluids should not be mixed, refer to the fluid manufacturer's recommendations.

S4.5.2 Volume

The expansion tank must have sufficient volume to handle the required expansion of the total system thermal liquid at the required operating temperature.

The expansion tank should be sized so that when the thermal liquid in the system is cold, the tank will be one quarter full or as recommended by the manufacturer. When the system is up to operating temperature, the expansion tank will not be over three quarters full. A high expansion tank liquid level alarm may be used for indication of high liquid level in the expansion tank(s). An expansion tank low level switch (or similar device) should be used to ensure the appropriate minimum level of fluid in the tank per the manufacture's recommendation. Tripping of this switch should shut down the pump and burner. The activation of this switch should activate an audible alarm. All expansion tank vents and drains must be piped to a safe catchment.

If the expansion tank is to be pressurized with an inert gas, a safety relief valve shall be installed on the expansion tank. This safety relief valve shall be piped to a safe catchment.

S4.5.3 CONNECTION

The circulating pump shall be piped to the return inlet connection to the thermal fluid heater.

The expansion tank shall be installed at an elevation above all piping when possible. If the tank is not at the highest elevation, an inert gas blanket shall be used to pressurize the system to overcome the weight of the fluid above the tank.
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a) Vented – To provide a Net Positive Suction Head for the circulating pump the expansion tank should be accomodate the NPSH requirements of the circulating pump. For non-pressurized tanks, a vent connection (open to the atmosphere) is part of the design and should be piped to a safe catchment with no valve in the piping.
b) Pressurized – The expansion tank can be pressurized with nitrogen or other inert gas as recommended by the fluid manufacturer and provisions made to provide a continuous recommended pressure. The pressure can be adjusted to meet the Net Positive Suction Head requirements of the

circulating pump. Compressed air is not recommended as it oxidizes the thermal fluid. Carbon Dioxide is not recommended as it dissolves into the fluid and can create cavitation or other problems in the system.

S4.5.4 CIRCULATING PUMP

It is essential that the pump selection be made by competent personnel that are knowledgeable of the requirements of the specific system. Special attention to hot and cold alignment requirements and pump cooling requirements must be considered. The circulating pump must provide:

a) The required velocity flow across the heater tube surface.

b) Handle the Total System Head.

c) Be specifically designed to handle the thermal fluid used at the high temperatures involved including cold start conditions.

A strainer should be located in each pump suction piping.

Dual pumps are often installed to provide 100% redundancy in the case of a pump failure. A flexible connection in and out of each pump is recommended.

S4.5.5 PIPING AND VALVES

Carbon Steel Pipe such as ASTM A-53 or ASTM A-106 is preferred for the entire piping system. Seamless pipe should be used for thermal fluid piping. Copper, copper alloys, brass, bronze aluminum or cast iron **shall not** be used since they are incompatible with thermal fluid. All joints and connections 1" and over should be welded. When it is not possible to weld, forged steel fittings and flanges suitable for the temperature and pressure of the system may be used. All flange gaskets should be suitable for the operating temperature, pressure and fluid used. Special attention shall be given to the expansion of the piping due to the high temperatures involved.

Valves shall be of steel material compatible for the thermal fluid and temperatures and shall be flanged or weld type manufactured from cast or forged steel or ductile iron. Valve internals and gland seals shall be made from materials suitable for use with high temperature fluids and compatible with the specific fluid utilized in the system.

When 2-way valves are utilized in the piping system, a back pressure regulating valve or automatic bypass valve shall be incorporated to ensure the proper flow through the heater at all times regardless of control valve position if 3-way valves are used, balancing valves should be included.

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Design of piping supports should be in accordance with jurisdictional requirements, manufacture's recommendations and/or other industry standards as applicable.

Hot oil pipe insulation should be a minimum of 2" thick high temperature, laminated foam glass or cellular glass (non-absorbent) insulation.

S4.5.6 FUEL

Fuel trains for thermal fluid heaters with burner inputs

a) less than 12.5 MM Btu/hr shall meet the requirements of ASME CSD-1,
b) 12.5 MM Btu/hr or greater shall meet the requirements of NFPA 87,

and shall be installed in accordance with jurisdictional and environmental requirements, and manufacturer's recommendations.

S4.5.7 ELECTRICAL

a) All wiring for controls, heat generating apparatus, and other appurtenances necessary for the operation of the thermal fluid heater(s) should be installed in accordance with the provisions of national or international standards and comply with the applicable local electrical codes.

b) A manually operated remote shutdown switch or circuit breaker shall be located just outside the equipment room door and marked for easy identification. Consideration should also be given to the type and location of the switch to safeguard against tampering.

c) If the equipment room door is on the building exterior, the shutdown switch shall be located just inside the door. If there is more than one door to the equipment room, there shall be a shutdown switch located at each door of egress.

   1) For atmospheric-gas burners, and oil burners where a fan is on a common shaft with the oil pump, the complete burner and controls should be shut off.

   2) For power burners with detached auxiliaries, only the fuel input supply to the firebox need be shut off.

d) Controls for Heat Generating Apparatus

   1) Oil and gas-fired and electrically heated thermal fluid heaters shall be equipped with suitable primary (flame safeguard) safety controls, safety limit switches and controls, and burners or electric elements as required by a nationally or internationally recognized standard.

The symbol of the certifying organization that has investigated such equipment as having complied with a nationally recognized standard shall be affixed to the equipment and shall be considered as evidence that the unit was manufactured in accordance with that standard. Thermal fluid heater shall have a;

a) Expansion tank low level switch- liquid level switch (or similar device) interlocked with the circulating pump operation to confirm minimum level in the expansion tank when the system is cold. This interlock prevents pump cavitation. The function of this device shall prevent burner and pump operation if the liquid level is not adequate.

b) Thermal fluid temperature operation control. This temperature actuated control shall shut down the fuel supply when the system reaches a preset operation temperature. This requirement does not preclude the use of additional operation control devices when required.

c) High temperature limit safety switch on the located on the thermal fluid heater outlet. This limit shall prevent the fluid temperature from exceeding the maximum allowable temperature of the specific fluid. The high temperature limit safety switch set point should be set no higher than the maximum temperature specified by the fluid manufacturer, heater design or downstream process limits, whichever is lowest. Functioning of this control shall cause a safety shutdown and lockout. The manual rest may be incorporated in the temperature limit control. Where a reset device is separate from the temperature limit control, a means shall be provided to indicate actuation of the temperature sensing element. Each limit and operating control shall have its own sensing element and operating switch.

d) Primary flame safety control for each main burner assembly. This control shall de-energize the main fuel shut off valve and shut off pilot fuel upon loss of flame at the point of supervision. The function of this control shall cause a safety shutdown and lockout.

e) Power burners and mechanical draft atmospheric burners shall provide for the preignition purging of the combustion chamber and flue passes. The purge shall provide no fewer than four air changes or greater as specified the manufacturer.

f) Proof of flow interlock- thermal fluid heaters require a minimum flow rate to ensure proper velocities and film temperatures through the heater. A low flow condition can cause overheating, degradation of the fluid or heater coil or tube failure. Activation of this interlock shall cause a safety shutdown of the burner and pump. This requirement should be accomplished by:

1) Utilizing A differential pressure switch is the recommended method for proving flow and allow for a discrete setpoint. The normally open switch senses pressure on the inlet and outlet heater at operating temperature. Tripping of this switch indicates improper flow through the heater.
2) Utilizing a flow switch to provide an alternative means of proving flow.
3) Utilizing a orifice in the piping system in conjunction with a differential pressure switch.
4) Utilizing **vortex** shedding meters may also be employed, however the meter must be selected based on the fluid and operating temperature for proper performance.

2) Thermal fluid heaters should also have:

a) A high stack temperature switch interlock - in the event of a high stack temperature (indication of improper combustion or cracked coil) this device shall shut off the burner and circulating pump and cause a lockout condition.

b) An inert gas smothering system (steam or CO_2)- this system is used to quench combustion in the event of a cracked heater coil or tube. The gas smothering system should be installed per local codes and requirements. A typical system may include two stack limit switches, an alarm and valve to allow inert gas to enter the combustion chamber. One stack limit is set at a value above the typical stack temperature for the equipment (1000 deg. F) and the second is set at 100 deg. F above the first. If the limit is tripped, the pump and burner will shut down. If the second limit is tripped, the inert gas enter the combustion chamber to quench the flame.

c) A high inlet pressure switch – this normally closed switch senses pressure at the heater inlet and its setpoint is determined based on the system design pressure when the system is cold. Activation of this switch indicates a restriction in flow and shall shutdown the thermal burner and pump and cause a lockout condition.

d) A low inlet pressure switch- this normally open switch senses pressure at the heater inlet and its setpoint is determined based on system pressure when the system is operating at temperature. Activation of this switch indicates a restriction in flow and shall shutdown the thermal burner and pump and cause a lockout condition.

e) A high outlet pressure switch – this normally closed switch senses pressure at the heater outlet and it's setpoint is determined based on the system pressures when the system is at operating temperature. Activation of this switch indicates a restriction in flow and shall shutdown the thermal burner and pump and cause a lockout condition. Note: the setpoint of this switch should be lower than the safety relief valve setting.

3) These devices shall be installed in accordance with jurisdictional and environmental requirements, manufacturer's recommendations, and/or industry standards, as applicable.

S4.5.8 VENTILATION AND COMBUSTION AIR

a) The thermal fluid heater room shall have an adequate air supply to permit clean, safe combustion, minimize soot formation, and maintain a minimum of 19.5% oxygen in the air of the boiler room and sufficient to maintain ambient temperatures of less than 100 Deg. F. The combustion and ventilation air should be supplied by either an unobstructed air opening or by power ventilation or fans.

b) Unobstructed air openings shall be sized on the basis of 1 sq. in. (650 sq. mm) free area per 2000 Btu/hr (586 W) maximum fuel input of the combined burners located in the boiler room, or as specified in the National Fire Protection Association (NFPA) standards for oil and gas burning installations for the particular job conditions. The boiler room air supply openings shall be kept clear at all times.

c) Power ventilators or fans shall be sized on the basis of 0.2 cfm (0.0057 cu meters per minute) for each 1000 Btu/hr (293 W) of maximum fuel input for the combined burners of all boilers located in the boiler room. Additional capacity may be required for any other fuel burning equipment in the boiler room. Pressure in the room should be neutral.

d) When power ventilators or fans are used to supply combustion air they shall be installed with interlock devices so that the burners will not operate without an adequate number of ventilators/fans in operation.

e) The size of openings specified in (b) may be reduced when special engineered air supply systems approved by the Jurisdiction are used.

f) Care should be taken to ensure that thermal fluid lines are not routed across combustion air openings, where freezing may occur in cold climates.

1 Fans – When combustion air is supplied to the thermal fluid heater by an independent duct, with or without the employment of power ventilators or fans, the duct shall be sized and installed in accordance with the manufacturer's recommendations. However, ventilation for the boiler room must still be considered.

S4.5.9 LIGHTING

The thermal fluid heater room should be well lighted and it should have an emergency light source for use in case of power failure.

S4.5.10 EMERGENCY VALVES AND CONTROLS

All emergency shut-off valves and controls shall be accessible from a floor, platform, walkway, or runway. Accessibility shall mean within a 6 ft. (1.8 m) elevation of the standing space and not more than 12 in. (305 mm) horizontally from the standing space edge.

S4.6 DISCHARGE REQUIREMENTS

S4.6.1 CHIMNEY OR STACK

Chimneys or stacks shall be installed in accordance with jurisdictional and environmental requirements, manufacturer's recommendations, and/or industry standards, as applicable.

S4.6.2 DRAINS

A drain outlet connection and valve shall be installed at the low point of the system piping. This drain connection shall be provided with a cap or plug to prevent leakage or accidental discharge of the thermal fluid. This is for draining the fluid should this become necessary. Copper and copper alloys should not be used. Cast iron should not be used because of the tendency to shock fracture. Drain piping 1" or above should be welded. The valve should never be opened when there is temperature on the system.

S4.6.3 AIR VENT

A manual air vent valve must be installed on the high point of the system piping. Copper and copper alloys should not be used. Cast iron should not be used because of its tendency to shock fracture. Vent piping 1" or above should be welded. The valve should never be opened when there is temperature on the system.

S4.7 CONTROLS and INSTURMENTTATION

General

a) Safety valves are designed to relieve steam.

b) Safety relief valves are valves designed to relieve either steam or water, depending on the application.

c) Safety and safety relief valves are to be manufactured in accordance with a national or international standard.

d) Deadweight or weighted-lever pressure-relieving valves shall not be used.

e) Thermal fluid heater, safety relief valves shall have a closed bonnet, and safety relief valve bodies shall not be constructed of cast iron.

f) Safety and safety relief valves with an inlet connection greater than NPS 3 (DN 80) used for pressure greater than 15 psig (103 kPa), shall have a flange inlet connection or a welding-end inlet connection. The dimensions of flanges subjected to boiler pressure shall conform to the applicable standards.

g) When a safety or safety relief valve is exposed to outdoor elements that may affect operation of the valve, it is permissible to shield the valve with a cover. The cover shall be properly vented and arranged to permit servicing and normal operation of the valve.

S4.8.1.1 Number

At least one National Board capacity certified safety or safety relief valve shall be installed on the boiler. If the boiler has more than 500 sq. ft. (46 sq. m.) of heating surface, or if an electric boiler has a power input of more than 3.76 million BTU/hr (1100 kW), two or more National Board capacity certified safety or safety relief valves shall be installed.

S4.8.1.2 Location

a) Safety or safety relief valves shall be placed on, or as close as physically possible, to the boiler proper.
b) Safety or safety relief valves shall not be placed on the feedline.
c) Safety or safety relief valves shall be connected to the boiler independent of any other connection without any unnecessary intervening pipe or fittings. Such intervening pipe or fittings shall not be longer than the face-to-face dimension of the corresponding tee fitting of the same diameter and pressure rating as listed in the applicable standards.

S4.8.1.3 Capacity

a) The pressure-relieving valve capacity for each boiler shall be such that the valve or valves will discharge all the steam that can be generated by the boiler without allowing the pressure to rise more than 6% above the highest pressure at which any valve is set and in no case to more than 6% above the maximum allowable working pressure of the boiler.
b) The minimum relieving capacity for other than electric boilers and forced-flow steam generators with no fixed steam line and waterline shall be estimated for the boiler and waterwall heating surfaces as given in Table 2.9.1.3, but in no case should the minimum relieving capacity be less than the maximum designed steaming capacity as determined by the manufacturer.
c) The required relieving capacity in pounds per hour of the safety or safety relief valves on a high temperature water boiler shall be determined by dividing the maximum output in Btu at the boiler nozzle obtained by the firing of any fuel for which the unit is designed by one thousand.

d) The minimum safety or safety relief valve relieving capacity for electric boilers is 3.5 lbs/hr/kW (1.6 kg/hr/kW) input.

e) If the safety or safety relief valve capacity cannot be computed, or if it is desirable to prove the computations, it should be checked by any one of the following methods; and if found insufficient, additional relieving capacity shall be provided:

1) By performing an accumulation test, that is, by shutting off all other steam discharge outlets from the boiler and forcing the fires to the maximum. This method should not be used on a boiler with a superheater or reheater or on a high temperature water boiler.

2) By measuring the maximum amount of fuel that can be burned and computing the corresponding evaporative capacity upon the basis of the heating value of the fuel.

3) By determining the maximum evaporative capacity by measuring the feedwater. The sum of the safety valve capacities marked on the valves shall be equal to or greater than the maximum evaporative capacity of the boiler. This method should not be used on high temperature water boilers.

S4.10 Testing and Acceptance

S4.10.1 General

a) Care shall be exercised during installation to prevent loose weld material, welding rods, small tools, and miscellaneous scrap metal from getting into the thermal fluid system. Where possible, an inspection of the interior of the thermal fluid heater and its appurtenances shall be made for the presence of foreign debris prior to making the final closure.

b) Safe operation should be verified by a person familiar with boiler system operations for all boilers and connected appurtenances and all pressure piping connecting them to the appurtenances and all piping.

c) The wall thickness of all pipe connections shall comply with the requirements of the code of construction for the thermal fluid heater.

d) All threaded pipe connections shall engage at least five full threads of the pipe or fitting.

e) In bolted connections, the bolts, studs, and nuts shall be marked as required by the original Code of Construction and be fully engaged (e.g., the end of the bolt or stud shall protrude through the nut).

f) Washers shall only be used when specified by the manufacturer of the part being installed.

S4.10.2 Pressure Test

Prior to initial operation, the completed thermal fluid heater system, including pressure piping, pumps, stop valves, etc., shall be pressure tested in accordance with the manufactures recommendations. Hydrostatic testing of the system is not recommended due to possible contamination of the system. All pressure testing should be witnessed by an Inspector.

S4.8.3 Nondestructive

Examination
Thermal fluid heater components and subcomponents shall be nondestructively examined as required by the governing Code of Construction.

S4.8.4 System Testing
Prior to final acceptance, an operational test shall be performed on the complete installation. The test data shall be recorded and the data made available to the jurisdictional authorities as evidence that the installation complies with the provisions of the governing code(s) of construction. This operational test may be used as the final acceptance of the unit.

S4.8.4 Final Acceptance
A thermal fluid heater may not be placed into service until its installation has been inspected and accepted by the appropriate jurisdictional authorities.

S4.8.5 Installation Report

a) Upon completion, inspection, and acceptance of the installation, the installer shall complete and certify the *Boiler Installation Report* I-1. See 1.4.5.1.

b) The *Boiler Installation Report* I-1 shall be submitted as follows:

1) one copy to the Owner; and

2) one copy to the Jurisdiction, if required.

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CORPORATE:
25920 Eden Landing Road
Hayward, CA 94545-3816
Phone: 510.784.0110
Fax: 510.784.1004
www.rfmacdonald.com

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August 21, 2012

Mr. Umberto D'Urso
ASME
Three Park Avenue
New York, NY 10016

Subject: NB11-2001 Economizers – ASME Request for Interpretation

Mr. D'Urso,

I am on the NBIC Sub-Group for Pressure Vessels & Piping and Sub-Committee for Installations. We have a request for change of current language in Part 1, 2.9.4 – Economizers. See attached copy of current language and proposed language.

In order to be consistent and compliant with ASME it was brought to our attention that this might conflict with ASME. So I have the following requests for interpretation.

Question: Does PG71.2 apply to the mounting of a safety relief valve for an economizer?
Answer: No

Question: Does Figure 58.3.1(b) dictate that the safety relief valve for an economizer be located at its outlet?
Answer: No

Your prompt reply will be greatly appreciated. If you have any questions regarding the above interpretation please contact me at (510) 670-7422 or by email at don.patten@rfmacdonald.com.

Sincerely yours,

Donald Patten

Donald Patten
Director of Project Management and Technical Support