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Operating Procedures

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☐ Policy

☒ Procedure

☐ Directive

PURPOSE:

To explain the Certificate Inspection of a typical metal Pressure Vessel subject to Internal Corrosion. A Pressure Vessel subject to Internal Corrosion shall be defined as any metal Pressure Vessel using a process product that can cause Corrosion, Erosion, Pitting, Cracking, or Deterioration, as defined in Part 2, 3.3 of the National Board Inspection Code. The intent is to verify the vessel is safe to operate.

GENERAL:

The following is a guideline for Inspectors and Owners to be used along with Procedure PVIP1A (Pressure Vessel Inspection), to perform *the required* Internal Inspection(s). Pressure Vessels subject to internal corrosion shall receive a Certificate Inspection every three (3) years. Owner-Users qualified in accordance with Section 15 of the Illinois Boiler & Pressure Vessel Safety Act (430 ILCS 75) shall have the option of using API-510 or the NBIC for inspection intervals. This inspection shall be external and internal where conditions permit,* however, small air receivers and domestic hot water supply storage vessels, or vessels without man-way openings, may substitute thickness readings compared to original material thickness values when internal inspection is impractical. The original thickness values can be found on the Manufacturer's Data Report or Manufacturer's Certificate of Compliance. In some instances, although not required by the ASME B&PV Code, some vessel manufacturers include the shell and head thickness on the nameplate. These dimensions shall be used to determine vessel wear and safe operating pressures.

The Initial Inspection of a new ASME code stamped vessel need not be internal, regardless of service, and an internal inspection shall not be required of pressure vessels containing materials that are known to be non-corrosive to the material of which the shell, heads, or fittings are constructed.

An Internal Inspection is defined as, "as complete an examination as can reasonably be made of the internal and external surfaces of the pressure vessel while it is shut-down and man-hole plates, hand-hole plates, or other inspection opening closures are removed as required by the inspector".

***Where Conditions Permit:** Should a pressure vessel be configured or in a service as to not allow opening or safe human entry for actual visual inspection, alternate methods will be allowed to ensure the integrity and safe operation of said vessel. These methods can be Ultrasonic Thickness, Phased Array UT, Eddy Current, Radiography, Boroscope/Flexiscope, digital photography, or another method acceptable to the Inspector. If an Internal Inspection is not performed, an explanation as to why not and the alternate method used shall be documented on the Inspection Report.

PROCEDURE:

- A. If not previously arranged, schedule to have vessel taken out of service and “locked-out” as necessary. Instruct owner which access locations need to be opened/removed for the internal inspection, and if any internal trays or equipment need to be removed.
- B. Perform both the Internal and External Inspection of the Pressure Vessel as installed. Observe vessel use, and inquire as to the products used within. Review Manufacturer’s Data Report (if available) for information on design for corrosive service, corrosion allowance (if noted) and shell thicknesses, etc.
- C. **Confined Space Entry:**
At no time shall any inspector be allowed to enter a pressure vessel or confined space without the necessary training and guidance of the owners’ specific site procedure(s). Vessel entry can only then occur when necessary retrieval equipment and safety personnel are available. If the vessel contained substances harmful to the inspector, prior to entry, the vessel shall be cleaned and verified by the owner that it is safe for entry. If unsafe conditions exist, then alternate methods of inspection shall be performed.
- D. **Tools and Equipment:**
Where actual visual inspection of internal surfaces is not possible, the use of NDE, mirrors, portable lighting, and video equipment (cameras, borescopes, etc.) may be used to provide observation of both internal and external surfaces at the discretion of the inspector. As a minimum, where internal surfaces are not accessible for visual inspection, random thickness testing (UT) of suspect surfaces shall be performed and compared to minimum thickness requirements, and documented on the Inspection Report. If present, insulation must be removed as necessary, to allow access to vessel surfaces.
- E. Inspection should include (and not be limited to) the following areas;
 - a. Welds
 - b. Shell
 - c. Heads
 - d. Spray Nozzles & Trays
 - e. Vents, Inlets/Outlets, and Drains.
 - f. Supports
 - g. Fittings and Attachments.

F. Results:

1. Any discovered deficiencies (cracks, pitting, corrosion, etc.) shall be noted on the Inspection Report. Vessel use should be discontinued until satisfactory repairs have been made. If deficiencies are severe, the vessel shall immediately be taken out of service and repaired or replaced. Any repairs necessary on both ASME Code and Non-code vessels shall be performed in accordance with the IL Boiler and Pressure Vessel Safety Act, and the National Board Inspection Code.
2. If thinning or shell wear has occurred, (beyond original thickness allowances) the vessel may qualify to be “de-rated” for Maximum Allowable Working Pressure (MAWP). This shall be considered following the guidelines in OSFM Procedure for De-rating Pressure Vessels; PVIP3A

G. Completion of Inspection Report:

1. The Inspector shall note on the Inspection Report what type of inspection was performed; (Internal or External), along with inspection results. These results shall be submitted along with the inspection report (and recorded in object comments) as to be part of the inspection that can be retrieved at a later date as necessary.
2. If an Internal Inspection was needed and *not* performed, a comment shall also be noted as to reason why, and when the internal will be completed. At the present time, there are no rules or guidelines allowing the extension of a Pressure Vessel Inspection Certificate. If a Pressure Vessel is to have an internal inspection that can't be performed at the time of Certificate expiration, an External Inspection shall be performed (to issue Certificate) and the Internal scheduled for completion prior to the next certificate expiration. In the event that the “extended” internal inspection is not performed, the vessel shall be removed from service until the internal is performed and accepted by the Inspector.

H. Upon satisfactory review, the Chief Inspector will issue the required Certificate of Inspection.