

## Maintenance, Repairs and Alterations of Oilfield Vessel Firetube Assemblies

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## 1. Scope

This document is intended to clarify TSASK's requirements for the maintenance, repair and alterations of oilfield vessel firetube assemblies.

## 2. Exclusions from the Definition of Maintenance

The scope of this information paper shall not be applied to:

- any other piece of pressure equipment; or
- any work not explicitly completed on oilfield vessel firetube assemblies.

## 3. Definitions

For the purposes of this information paper, the following definitions apply:

### 3.1. Firetube assembly:

- the flange and the tube

### 3.2. Maintenance:

- the repair or replacement in kind of valves, fittings, instrumentation or piping with an internal volume of 0.5m<sup>3</sup> or less; or
- the removal and replacement of components for the purpose of periodic inspection functions.

Refer to [IP-2008-07-05 TSASK Definition of Maintenance](#) for more information.

### 3.3. Repair (CSA B51-14 Part 1 Clause 3):

- the work necessary to restore a boiler or pressure vessel to a safe and satisfactory operating condition, provided that there is no deviation from the original design.

For firetube assemblies, there are two types of repairs:

- Minor Repairs – the building up of wasted areas with weld metal or repairing defects **provided** (NBIC Part 3 Clause 3.3.2(e)3):
  - the wasted area to be repaired on each firetube does not exceed 100 sq. in. (0.065 sq. m.);
  - any wasting, crack or defect is no deeper than 25% of nominal wall thickness or ½", whichever is less, of the material being repaired; and
  - the repaired area is examined using one or more forms of nondestructive examination.
- Major Repairs – are:
  - any repair that exceeds the limitations of a minor repair; or
  - when any material in the firetube assembly is replaced.

### 3.4. Alteration (CSA B51-14 Part 1 Clause 3):

- a change in an item described in an original manufacturer's data report that requires a change of design calculations or otherwise affects the pressure-containing capability of a boiler or pressure vessel. Non-physical changes such as an increase in the MAWP (internal and external) or design temperature of a boiler or pressure vessel are also considered alterations, as are reductions, e.g., in minimum temperature, such that additional mechanical tests are required.

An alteration that does not affect the registered design calculations does not require acceptance by TSASK. An example would be the shortening of the firetube tube. Material changes do affect the registered design and shall be submitted to TSASK for acceptance

#### **4. Background**

TSASK requirements for the maintenance, repair and alterations of oilfield vessel firetube assemblies have been inconsistently applied across Saskatchewan. The purpose of this paper is to align all owners, service companies and Quality Control Program (QCP) holders involved with oilfield vessel firetube assemblies with TSASK requirements.

#### **5. Owner's Responsibilities**

Owners are responsible for their pressure equipment at all times. Owners shall ensure that only competent and properly licensed individuals and organizations (if required) are performing the work on their equipment.

Owners shall have approved procedures for doing any work considered maintenance such as the installation of oilfield vessel firetube assembly, leak tests and the torquing of the flange bolts. All reassembly and/or testing shall be performed by competent individuals using the owner approved procedures.

Owner approved procedures shall be available to TSASK upon request. If the procedure belongs to the organization hired to perform the maintenance, then proof that the owner has reviewed and accepted the procedure(s) shall be available to TSASK upon request.

#### **6. Quality Control Program Companies**

QCP companies shall ensure that their manual requirements are met. If the QCP Company is ever unsure of the scope of work allowed by TSASK under the definition of "minor repair", they are advised to contact TSASK directly for clarification.

#### **7. Test or Examination Methods Acceptable to TSASK**

According to the National Board Inspection Code (NBIC) Part 3 Section 4, one or a combination of examination and test methods shall be applied when determining the integrity of a repair or alteration. TSASK shall accept either a pressure test or a combination of non-destructive examination (NDE) with a leak test for oilfield vessels firetube assembly repairs or alterations.

##### **7.1. Pressure Tests**

If the pressure test is to be performed to ensure the integrity of the repair or alteration, the pressure test shall be conducted in accordance with NBIC Part 3 by a QCP Company. The pressure test shall be conducted using water or other liquid medium. The test pressure shall be the minimum required to verify the leak tightness integrity of the repair or alteration; but, shall not exceed 150% of maximum allowable working pressure (MAWP) of the oilfield vessel.

##### **7.2. Non-Destructive Examination**

If NDE methods are to be used to ensure the integrity of the repair or alteration, the requirements of NBIC Part 3 shall be met. As stated in NBIC Part 3 Section 4, the NDE methods used shall be suitable for providing meaningful results to verify the integrity of the repair or alteration.

In addition to the NDE performed, a leak test shall be performed on firetube assembly upon installation into the oilfield vessel. The purpose of the leak test is to verify the leak tightness of all the pressure boundaries including, but not limited to, the flange connections. This leak test shall be of a sufficient pressure to ensure the tightness of all joints.

The leak test may be performed by the owner or an oil servicing company who does not have a QCP nor a contractor's licence provided the owner of the oilfield vessel or the servicing company installing the firetube assembly has procedures in place to perform the leak test. If the servicing company's procedures are to be used, there shall be evidence that the owner has reviewed and accepted the procedures.

TSASK reserves the right to review the owner approved procedures (either the owner's or the servicing company's) at any time.

## **8. Fabrication**

Any fabrication of a new firetube assembly shall be to a registered design. Firetube assemblies are either registered as part of the original vessel, as a separate design or a fitting. All three types require a partial data report that shall be signed by TSASK, jurisdictional authority or authorized inspector as applicable.

### **8.1. Inside Saskatchewan:**

- fabricators shall follow the requirements of their QCP.

### **8.2. Outside of Saskatchewan but within Canada:**

- fabricators shall follow the QCP requirements of the jurisdiction where the fabrication takes place.

### **8.3. Outside of Canada:**

- fabricators shall follow the requirements of ASME Section VIII.

## **9. Markings on Flanges of Firetube Assemblies**

All flanges shall have identifiable markings. In some cases, the flanges may have traceable markings indicating they are parts for particular oilfield vessels. In addition, if the firetube assembly was registered as a fitting, the fitting symbol shall be visible on the flange.

## **10. Installing Firetube Assemblies into Oilfield Vessels**

Appendix I Table One provides guidance on TSASK's requirements when installing a firetube assembly into an oilfield vessel. The table provides five different scenarios and the minimum requirements of TSASK.

## **11. Additional Information or Questions**

For additional information or if there are any further questions or concerns, please contact TSASK:

- By email at [info@tsask.ca](mailto:info@tsask.ca);
- By phone at either (306) 798-7111 (Regina) or Toll Free (866) 530-8599. Please ask to speak to a TSASK inspector or the Manager, Boiler and Pressure Vessel Safety; or
- Visit the TSASK website at [www.tsask.ca](http://www.tsask.ca) for more information

## Appendix I – Installing Firetube Assemblies in Oilfield Vessels

This table is only applicable to the *installation of a firetube assembly into an oilfield vessel*. Do not use for the repair of firetube assemblies as the information is not applicable to the fabrication, repair and/or alteration of a firetube assembly. **Table One is for installation of firetube assemblies only.**

*Table One – Installing Firetube Assemblies in Oilfield Vessels*

Reinstalling the firetube assembly after <sup>1</sup> :	Type of Test or Examination Required for the Vessel	QCP Program/Licensed Contractor Required	TSASK Notification	Required TSASK documents
Maintenance to the Firetube Assembly	Leak Test <sup>2</sup>	No	No	None
Minor Repair to the Firetube Assembly	Leak Test <sup>2</sup>	No	Yes	TSK-1009
Major Repair to the Firetube Assembly	Liquid Pressure Test <sup>3</sup>	Yes	Yes	TSK-0001 TSK-1009
Alteration to the Firetube Assembly	Liquid Pressure Test <sup>3</sup>	Yes	Yes	TSK-0001 <sup>4</sup> TSK-1009 <sup>4</sup>
New Firetube Assembly	Liquid Pressure Test <sup>3</sup>	Yes	Yes	TSK-0001 <sup>4,5</sup> TSK-1009 <sup>4,5</sup>

*Notes for Table One:*

- Where a repair or alteration is performed on the oilfield vessel, such as nozzle replacement or shell repairs, all rules pertaining to a repair or alteration of a pressure vessel apply. This table is not intended to be used for pressure vessel repairs.
- Owner approved procedures shall be followed for such things as the leak test, torquing the flange bolts, etc.
- If the firetube assembly followed the NDE requirements of NBIC Part 3 Section 4, then a leak test is acceptable. When a non-QCP holder is performing the vessel leak test, an owner approved procedure shall be followed.
- Where the firetube assembly installed is not the original design, the change shall be reflected as an alteration on the TSK-0001 and TSK-1009 forms and to a registered design.
- Any fabrication of a new firetube assembly shall be to a registered design and documented on a partial data report. Partial data reports shall be signed by TSASK, jurisdictional authority or authorized inspector as applicable.