



SAFETY ASSESSMENT  
FEDERATION

# Guidelines

## Pressure Systems

Guidelines for the competent person – In-service examination of manhole and handhole spigot gaps in boilers and other pressure vessels

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## 1. Introduction

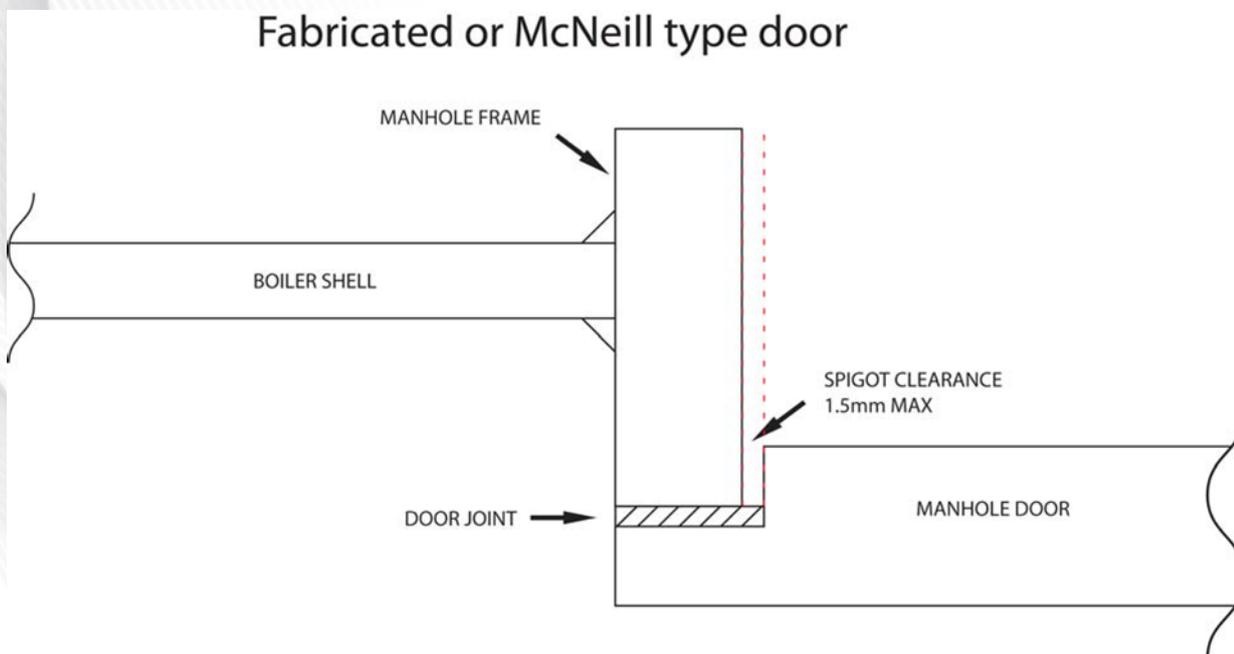
The purpose of these Guidelines is to provide advice to the Competent Person (CP) on specific aspects of examination of steam/hot water boilers and other pressure vessels with internally fitted doors.

Serious incidents have occurred where door joints have blown out due to excessive spigot gaps or incorrect assembly or positioning of doors e.g. Crown versus S.Y. Carola 1992 – 2 recorded fatalities – Subsequent prosecution of the CP for permitting an excessive spigot gap.

The risk is greatest for boiler doors below the water level where ejection of the boiler contents can affect persons in the immediate vicinity causing serious injury e.g. scalding/death.

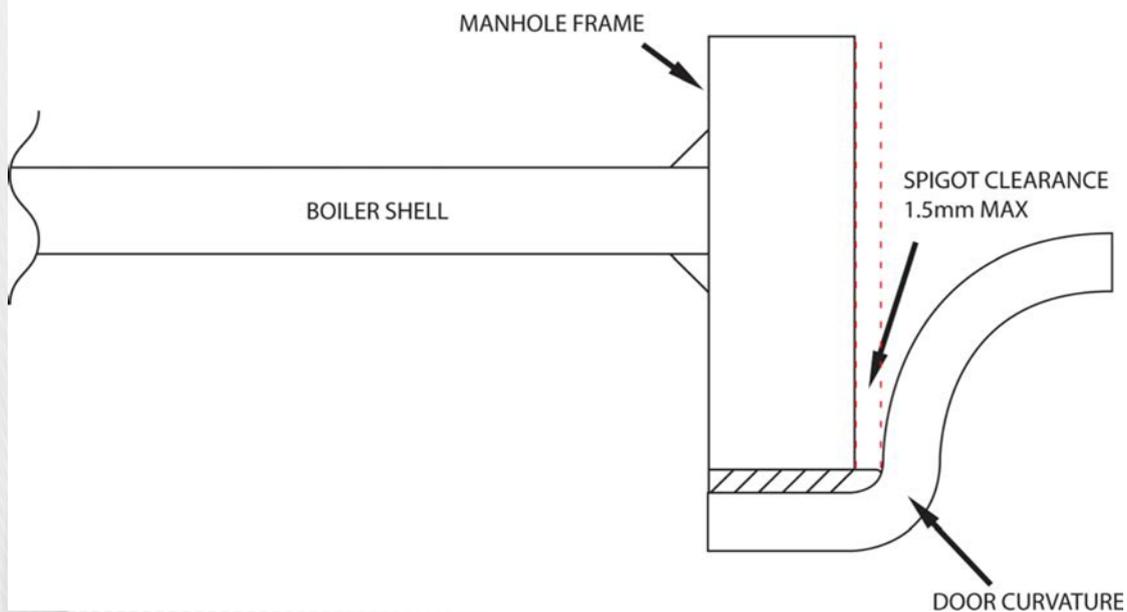
British and European Standards have generally required a maximum clearance of 1.5mm either side of the door giving a total clearance of 3mm. Some pressure equipment not built to these Standards may be in use in the UK and the door design and clearances should therefore be appropriately assessed.

Different door designs present difficulties in measuring clearances and consequently assessing the suitability for service. It is a requirement for the CP to ensure that doors are suitably fitted as part of the examination.



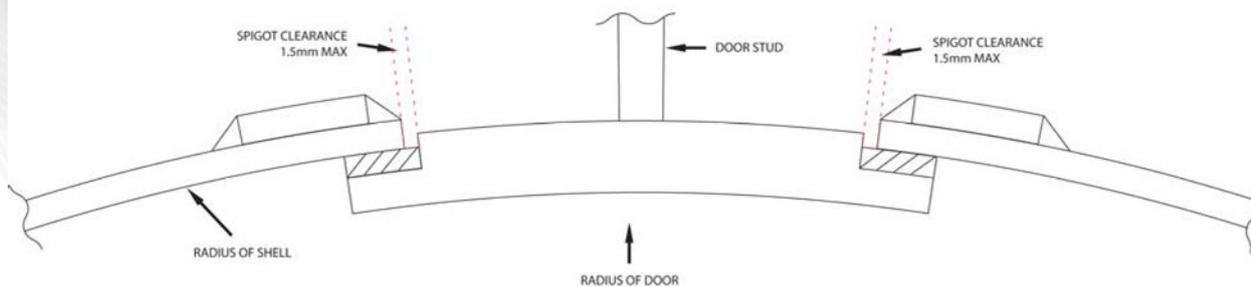
Spigot gaps can be readily measured with the door in position and with or without the door joint.

### Pressed steel type door



The curvature of the door and the radius adjacent to the joint seating area can interfere with the measurement depending on the thickness of the joint. Also the radius and the included angle can make the joint more susceptible to failure.

### Contour door - Can be fabricated/McNeill or pressed steel type



**Note:** The depth of the spigot should be such that the spigot enters the opening before the joint is compressed.

## **2. Scope**

These guidelines are intended to provide a consistent approach to examination of the hand, head and man hole door spigot gaps on steam/hot water boilers and other pressure vessels with internally fitted doors.

## **3. Hazard Assessment**

The maximum permitted spigot clearance within the harmonised Standards (e.g. EN 12953, EN 13445) is 1.5 mm (3 mm total). In practice SAFed members consider that a small increase in this gap due to service degradation e.g. less than 1 mm total may be acceptable. Gasket material is supplied in various thicknesses and proprietary types. It should be confirmed that the material is suitable for the operating conditions e.g. temperature and pressure and generally the minimum thickness necessary should be used.

The German Standard series TRD permits a maximum spigot clearance of 2 mm (4 mm in total). This would not necessarily be a cause for rejection provided that the boiler is manufactured to that Standard and suitable joint material is used. However with this additional clearance there is no margin for any further increase due to service degradation.

When a CP makes a judgement on whether a door is suitable for further service or requires repair/replacement it will be necessary to assess the likelihood of a door joint failure and the consequences of such an occurrence. If the gap is greater than 4 mm total consideration should be given to repairs to reduce the gap to the original code requirements. For boiler doors fitted below the water level an immediate repair should be carried out when there is excessive clearance

## **4. Guidance on measurement of spigot clearance**

### **4.1. Fabricated door or McNeill.**

Spigot gaps can be readily measured with the door in position and with or without the door joint because the spigot and the door frame/opening are parallel to each other.

Feeler gauges, plasticine, or other suitable guides can be used (the old door joint profile may provide an accurate measurement).

### **4.2. Pressed door**

The curvature of the door and the radius adjacent to the joint seating area can interfere with the measurement depending on the thickness of the joint. Generally it is more accurate to measure the gap without the joint in position because the thickness of the jointing material combined with the shape/profile of the door affects the clearance.

When an un-reinforced jointing material is used it should be ensured that the gap with the joint in position is less than the joint thickness.

Feeler gauges, plasticine, or other suitable guides can be used taking the curvature of the door and the seating flange radius into consideration.

#### 4.3. Contour door

These doors will exhibit the same characteristics as a pressed door and in addition they can have problems with trapping the joint or poor door assembly could prevent a correct seal. Where doors do not have a discernable spigot the door positioning should be such that the joint is compressed on both faces for full perimeter of the door and there is no metal to metal contact. For measuring purpose the door should fully assembled with the jointing material in place.

**Note:** Where curved doors are fitted into cylindrical shells it is important that the radius of the door matches the radius of the shell to ensure uniform compression of the joint. The fit of the door in the shell should be confirmed at each examination.

## 5. Remedial work

Options that could be employed to reduce the size of the gap could be to install a better fitting door or modify the existing door. Any changes or modifications should not affect the integrity of the plant and in all cases the CP is to be informed.

There are well established methods for the repair of fabricated or McNeill doors where the door spigot gap has increased. This method utilises weld overlay to the door, frame or plate edge dependant on where degradation has taken place and subsequent machining of the joint face.

Generally welding should not be carried out on pressed doors as the heat applied may cause the door face to distort causing sealing issues.