GUIDANCE

IN-SERVICE INSPECTION PROCEDURES

Number: PEC 11

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Status: Issue: 02 Date: 31/08/2010

Reference: Guidance for the competent person when considering the suitability of blowdown receivers associated with steam generating plant

Current Situation

The Health and Safety Executive guidance note PM60 (Steam Boiler Blowdown Systems) was first published in 1987 in response to a number of incidents caused by inadequately designed and manufactured blowdown systems. Although the document is now withdrawn the guidance has been extensively applied by the vast majority of blowdown system suppliers in the UK since its inception and has also been regarded by inspection bodies as the benchmark for acceptance. This has ensured that blowdown systems (and blowdown receivers in particular) have maintained a very good safety record for many years.

In more recent years blowdown receivers and systems have also been supplied into the UK by various European boiler manufacturers. The design of the blowdown receiver has not always aligned with the guidance given in PM60 and whilst this does not automatically make them unsuitable, it does mean that the Competent Person will need to ensure there is sufficient documentation/information available to verify the blowdown receiver is suitable for the particular application.

One of the recommendations of PM60 was that blowdown receivers should be built as a pressure vessel with a design pressure rating of at least 25% of the maximum working pressure of the boiler(s) they serve. This general rule ensures the blowdown receiver has adequate strength with additional provision for shock loading, corrosion and erosion that might occur during normal service.

Blowdown receivers may or may not come within the requirements of the Pressure Equipment Directive (PED). This is dependent on whether the pressure they foreseeably achieve during operation exceeds 0.5 bar but as they contain steam the Pressure Systems Safety Regulations will apply regardless. There are naturally commercial pressures with suppliers to manufacture blowdown receivers with design pressures not exceeding 0.5 bar so that they fall outside of the PED. However the technical justification for this is often questionable and it therefore presents a problem when these items are examined in accordance with a WSE.

Although blowdown receivers are open vented they are considered as pressure vessels for the purpose of examination. This is because of the potential for pressure accumulation during the boiler blowdown sequence. It was is a requirement of PM 60 that blowdown receivers should be examined at the same time as the boiler examination and for this reason they are generally included in the written scheme of examination for the steam plant.

The recent influx of blowdown receivers installed onto blowdown systems which are not compliant with PM60 and are rated for pressures less than 0.5 bar is presenting the competent person with problems when determining fitness for purpose. It is often very difficult to obtain information from manufacturers that demonstrate the pressure in the blowdown receiver will remain within its rated limits when installed on a particular boiler system. There are no British or European standards specifically dealing with blowdown receivers, although an informative annex (Annex D) in the soon to be published European shell boiler standard EN 12953-6: 2010 gives general guidance on the subject. This guidance allows the tanks to be designed by special analysis or by general rule using the pressure and vent size guidelines that were previously contained in PM60.

Guidance

The prime concern is the accumulation pressure arising in the receiver during blowdown and whether the pressure actually achieved is within the rating of the receiver. This is dependent on a number of factors, including the boiler pressure, blowdown line diameter, receiver vent diameter, receiver capacity and whether more than one boiler is blown down simultaneously. Where documentation is available that confirms the blowdown receiver has been built as a pressure vessel in accordance with the requirements of PM60 or Annex D of EN-12953-6: 2010 then it can be regarded as fit for purpose. A blowdown receiver can also satisfy the requirements of Annex D if it is built as an atmospheric vessel. In this case the documentation needs to confirm that it has had a specific assessment for suitability for the particular boiler blowdown system connected to it to demonstrate there will be no significant pressure accumulation during blowdown.

In the absence of adequate documentation the only practicable way of determining suitability is through pressure measurement during blowdown, using a pressure gauge or pressure recorder during operation to monitor the amount of pressure accumulation.

Other concerns that could affect the receiver integrity are sufficient robustness to withstand the shock loading during blowdown and sufficient provision for corrosion and erosion. Engineer Surveyors will need to make case by case judgments on the adequacy of blowdown receivers based on the documentation provided and the results of their initial examination. PM60 still represents what is generally recognised as good practice and should be used for reference purposes. For example PM60 recommends drain lines from level gauges, control chambers etc should be piped up to a separate manifold into the blowdown receiver. Some blowdown receivers supplied from other European states do not satisfy this requirement but it also needs to be recognised that alternative designs may be equally suitable for particular applications.

In the case of atmospheric (or near atmospheric) vessels which fall outside the scope of the PED there is still a legal requirement under Regulation 5 of PSSR for the supplier to provide sufficient written information relating to safe operating limits, operation and maintenance. The vessel should also have a nameplate or other means of permanent marking and be compatible with the system it serves. If there is any doubt as to the fitness for purpose of a blowdown system then a design assessment should be requested. It should be noted that calculations to evaluate pressure accumulation during blowdown can be complex and an empirical approach may be the better option.