

EPERC Task Group "Alternatives to the hydro testing for in-service pressure equipment"

Background

The in-service inspection to requalify pressure equipment after a certain period of operation comprises a set of different tests and inspections. In many European countries the specification of the testing and inspection scope lies within the responsibility of the respective national authority. Therefore the requalification process to be initiated by the owner/operator of the pressure equipment varies substantially across Europe. It may consist of a pressure test, an internal and external inspection as well as a leak test. Internal and external inspections are usually carried out visually by an authorised inspector and may be complemented by suitable non-destructive tests in order to assess particular sections of the pressure equipment in more detail (e.g. testing of weld seams or wall thickness measurements of areas affected by corrosion).

The pressure test is usually conducted as a hydrostatic test. This practice has been widely established in Europe for several reasons. In the course of the industrialisation more than 150 years ago, hydrostatic testing was an effective measure to raise the operational safety of steam boilers and pressure vessels to an acceptable level. Due to this success it became an essential part of the inspection routine and it still is till to date. Hydrostatic testing is generally considered to be a rather low risk activity compared to the performance of a pneumatic test, which needs quite a high effort to obtain the permit and then finally to conduct the test itself under stringent safety precautions.

Beside the merits described above, many owners/operators in Europe have identified general issues connected to the application of hydrostatic testing. Some of them are listed below:

- Overdesign of the foundation and the supports to bear the water weight just for the test
- Preparation procedure (e.g. emptying, isolation from the connecting pipe system etc.)
- Disposal of waste water and drying procedure for the internal shell
- Residual humidity and consequently the risk of product contamination
- Long down time due to preparation, performance and post-test treatment
- Limited outcome of the test (binary test result yes/no in terms of plastic deformation)
- Hydro testing of pressure equipment in very old plants can lead to initiation of cracks in aged components thus reducing their lifespan and increasing risk.

Alternative solutions to the traditional hydrostatic testing are already available. Performing a pneumatic test is one option among others. In order to reduce the potential risk connected to its application, it is possible to combine it with an acoustic emission test or to replace it by an acoustic emission test at all. The technical requirement on an alternative solution is in any case that it provides at least an equivalent level of safety compared to the hydrostatic testing. The legal environment given at the site of installation finally rules which kind of alternatives may be applied in the course of pressure equipment requalification. The regulations addressing the operation of pressure equipment for owners/operators in Europe are quite different and depend strongly from the national or even regional experiences. As a consequence isolated solutions are the common practice in Europe. This calls for a European approach to harmonise the boundary conditions for the operation of pressure equipment.

Task Group Proposal

The objectives of the Task Group (TG) are:

- Analyse and compare different national practices for in-service hydrostatic testing with focus on European countries. An extension of this task to relevant countries outside of Europe is intended. To achieve this objective, structured information from selected countries regarding their national legal environment for the operation of pressure equipment shall be gathered by conducting surveys among interested parties like manufacturers, owners/operators, testing and inspection organisations or authorities.
- Search for good practice examples for the replacement of or alternatives to the hydrostatic testing in the course of the surveys described above. Compile applicable guidelines, codes and standards for performance of the alternative solutions.
- Seek for collaboration with other task/working groups dealing with preparation of guidelines, codes and standards for in-service inspection of pressure equipment at European and at international level.
- Prepare compilation of alternative solutions to the hydrostatic test together with available guidelines, codes and standards as well as good practice examples.
- Make available the results of the performed work to interested parties by means of an EPERC review document. The contents of this document will be proposed by the TG and they need to be agreed by the EPERC board.

Status of the performed work

At the time being important results have been obtained by the first part of the survey oriented to analyse the different approaches and regulations in place in Europe (“state of the art for requalification of in-service pressure equipment across Europe” questionnaire).

Restart of the activity of the TG will be based on a thorough analysis of such results and to evaluation of available technics correlated to existing standards and on-going projects of standards to be used for:

- Preparing a list of possible alternative solutions to the hydrostatic test and in general to improve the quality of testing during an in-service inspection
- Submitting such alternative solutions to the EPERC board for its acknowledgment.
- Initiating a fruitful discussion and collaboration with other task/working groups in charge of updated and revision of PED directive and other in-service inspections regulations (maybe involving national standardization committees and authorities).

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