SEMMME3079

Preparing and testing pipework systems

Overview

This standard identifies the competences you need to test ferrous, non-ferrous and non-metallic pipework systems, in accordance with approved procedures. You will be required to select appropriate tools and test equipment to be used, based on the pipework system and test procedures being carried out. In preparing and testing the pipework system, you will be expected to use a range of hand tools, test equipment and techniques which are important to the test procedures. These activities will include such items as purging equipment and materials, compressed air test rigs, pressure gauges, and leak repair equipment and materials.

Your responsibilities will require you to comply with organisational policy and procedures for the preparation and testing of the pipework, and to report any problems with the equipment, testing activities or installations tested that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work with a minimum of supervision, taking personal responsibility for your own actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide a good understanding of your work, and will provide an informed approach to applying pipework preparation and testing activities. You will understand the pipework system being tested, and its application, and will know about the preparations required, equipment to be used and tests to be carried out, in adequate depth to provide a sound basis for carrying out the activities, correcting faults and ensuring the completed system performs to the required specification.

You will understand the safety precautions required when testing the pipework installation and with using the associated tools and equipment. You will be required to demonstrate safe working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace.

Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. follow the appropriate procedures for use of tools and equipment to carry out the required tests
3. set up and carry out the tests using the correct procedures and within agreed timescales
4. record the results of the tests in the appropriate format
5. review the results and carry out further tests if necessary

Knowledge and understanding

You need to know and understand:

1. how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. the personal protective equipment (PPE) to be worn whilst carrying out the testing activities
3. the hazards associated with testing pipework systems, and how to minimise them and reduce any risks
4. how to extract and use information from engineering drawings and related specifications (to include symbols and conventions to appropriate standards) in relation to work undertaken
5. how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
6. the importance of pipework colour codes, and the reasons for using the correct type of pipe material
7. the colour code standard used for identifying pipes, and why it is important
8. the various pressure test methods used on ferrous, non-ferrous and non-metallic pipelines
9. the importance of components being fitted in the correct relation to the direction of flow
10. the reasons for purging and venting pipework systems, and the consequences of not purging the pipework system
11. how to identify the fluids that can be used for flushing pipework systems, and the consequences of not flushing or of using the incorrect flushing agent
12. methods of testing the system, and the need to gradually increase pressure in the pipework system
13. the methods used to isolate parts of the pipework system for testing, and how this can be achieved
14. how the amount of test fluid for the pipework system is determined, and what problems would be caused if the incorrect amount were used
15. the factors that govern the choice of test equipment used in pressure testing of pipework systems, and the importance of equipment being calibrated
16. how the test pressures are determined, and the methods used to record pressure test results

17. the reasons for maintaining test pressures for specific times
18. how the results of the pressure test are analysed, and why this is important
19. how pipework systems are depressurised, and what environmental precautions must be taken
20. the procedures for recording test results and for reporting them to the relevant people
21. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

Scope/range related to performance criteria

1. Carry out all of the following during the testing activities:
   1.1 obtain and use the appropriate documentation
   1.2 adhere to procedures or systems in place for risk assessment, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
   1.3 check that all tools and equipment are in a safe and usable condition and are within current calibration date
   1.4 obtain clearance/authority to work on the installation
   1.5 provide and maintain a safe working environment for the testing activities
   1.6 ensure that appropriate safety measures are taken to protect test personnel
   1.7 follow safe practice/approved pipe testing techniques at all times
   1.8 return all tools and equipment to the correct location on completion of the pipe testing activities
   1.9 leave the work area and pipe system in a safe and appropriate condition on completion of the activities
   1.10 complete the relevant test documentation
2. Carry out tests on two of the following types of pipework installation:
   2.1 ferrous pipework
   2.2 small bore non-ferrous pipework
   2.3 non-metallic pipework
3. Prepare the installation for testing by carrying out all of the following, as applicable to the system:
   3.1 checking the security of all joints
   3.2 purging or flushing the system (as appropriate)
   3.3 fitting appropriate blanking plugs/plates to exposed ends of pipe or equipment
   3.4 connecting an appropriate test source
   3.5 fitting leak detection equipment and/or pressure gauges
4. Use one of the following types of test equipment:
   4.1 hydraulic test equipment
   4.2 gas test equipment
   4.3 compressed air test equipment
   4.4 water test equipment
5. Deal with two of the following complexities:
   5.1 systems with no faults
   5.2 systems with faults
   5.3 systems with intermittent faults
   5.4 incomplete or incorrect test results
6. During tests, use two of the following fault finding techniques:
   6.1 half-split technique
   6.2 input/output technique

6.3 six point technique
6.4 function/performance testing

7. Carry out appropriate tests, to include all of the following, as applicable to the system under test:
   7.1 filling system with appropriate test medium
   7.2 recording test results
   7.3 venting air from the system
   7.4 depressurising the system
   7.5 applying test pressures in incremental stages
   7.6 draining down the system (where appropriate)
   7.7 checking for leaks at each stage
8. Carry out tests to pipework systems, in compliance with one of the following:
   8.1 BS, ISO or BSEN standards
   8.2 customer standards and requirements
   8.3 company standards and procedures
   8.4 specific system requirements

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