SEMFWE243

Forming pipework by machine bending

Overview

This standard identifies the competencies you need to bend and form pipes using pipe bending machines, in accordance with approved procedures. You will be required to work to instruction with the appropriate type and size of machine and former, based on the pipe type, size and operations to be performed. In producing the pipework components, you will be required to operate the equipment safely and correctly, or to direct operations for their effective use, and to bend and form the pipe to the required profile without flats or deformations. The pipe bending and forming operations will include bending at right angles, bending to other angles, producing offsets, bridge sets, curved sections and expansion loops.

Your responsibilities will require you to comply with organisational policy and procedures for the use of the machines and the process activities undertaken, and to report any problems with the pipe forming equipment, materials or forming activities that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work to instructions, 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 be sufficient to provide a good understanding of your work, and will provide an informed approach to forming pipework using machine procedures. You will have an understanding of the characteristics of the equipment being used, the forming principles, and their application, and will know about the processes involved and their limitations, in sufficient depth to provide a sound basis for carrying out the activities, correcting any faults and ensuring the work output is produced to the required specification.

You will understand the safety precautions required when working with the forming machines and their 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. confirm that the equipment is set up correctly and is ready for use
3. manipulate the machine controls safely and correctly in line with operational procedures
4. produce pipework components to the required specification
5. carry out quality sampling checks at suitable intervals
6. deal promptly and effectively with problems within your control and report those that cannot be solved
7. shut down the equipment to a safe condition on conclusion of the machining activities

Knowledge and understanding

You need to know and understand:

1. the specific safety precautions to be taken when working with pipe bending equipment/bending machines in a fabrication environment
2. the general workshop and site safety requirements (statutory requirements, risk assessment procedures and relevant requirements of HASAWA, COSHH and Work Equipment Regulations; safe disposal of waste materials)
3. the safe working practices and procedures for operating power-operated bending and forming machines
4. the specific personal protective equipment (PPE) to be worn when carrying out the pipe bending activities (such as gloves, eye protection, safety helmets, ear protection)
5. the handling precautions and correct methods of moving or lifting long lengths or heavy pipes
6. the hazards associated with the pipe bending activities (handling long pipe lengths; using power operated bending equipment; using dangerous or badly maintained tools and equipment; using heating equipment), and how they can be minimised
7. how to extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS or ISO standards in relation to work undertaken)
8. principles and methods of marking out pipework, and the type of equipment used (such as direct marking; use of templates; use of set wires)
9. marking out conventions applicable to the bending process (such as centre lines, bending lines)
10. how to prepare the pipes in readiness for the bending and forming activities (visually checking for defects, cleaning the materials, removing burrs and sharp edges)
11. the characteristics of the various materials used, with regard to the bending operations and why some materials may require the addition of heat to aid the bending process
12. the various types of machines used to bend and form the pipe (including the use of hand bending machines, hydraulic bending equipment, power-operated equipment and heating methods)
13. how to prepare and set up the machine for a range of different bends (angled

bends, curved sections, twisted sections and straightening of sections)
14. how to produce the various bends required (such as angled bends, dog-leg sets, bridge sets and expansion loops)
15. ways of limiting distortion, wrinkles, marking and creases in the finished workpiece
16. the problems that can occur with the bending and forming activities, and how they can be avoided
17. the organisational quality control procedures that are used, and how to recognise defects in the bends that you produce
18. how to make dimensional and forming inspection checks, and the tools and equipment that can be used
19. the extent of your own authority and whom you should report to if you have problems that you cannot resolve
20. reporting lines and procedures, line supervision and technical experts

Scope/range related to performance criteria

1.

Confirm that the equipment is safe to use and fit for purpose, by carrying out all of the following checks:

- 1.1 the appropriate machine is selected for the operation being performed
- 1.2 the machine guards and safety devices are in position and function correctly
- 1.3 forming tools are appropriate and in a serviceable condition (secure, correct diameter, free of damage)
- 1.4 machine settings are suitable for the pipe diameter, material thickness and operations to be performed

2.

Use one of the following types of pipe bending machines:

- 2.1 hand operated manual bending machines (small diameter pipe)
- 2.2 hydraulically operated bending machines
- 2.3 powered pipe bending machines
- 2.4 CNC bending machines
- 2.5 power press with different former radii and sizes (pipe diameter)

3.

Bend and form one of the following types of pipework:

- 3.1 heavy duty pipes
- 3.2 structural pipes
- 3.3 small bore lubrication/fuel piping
- 3.4 high pressure pipes
- 3.5 cable ducting pipework

4.

Produce pipework forms that include three of the following:

- 4.1 right-angled bends
- 4.2 bridge sets
- 4.3 angular bends
- 4.4 expansion loops
- 4.5 offsets
- 4.6 curved sections
- 4.7 other specific form

5.

Bend and form pipes made from one of the following types of material:

- 5.1 ferrous steel
- 5.2 non-ferrous
- 5.3 special metals
- 5.4 other specific material

6.

Produce pipe bends and forms which comply with all of the following quality and accuracy standards:

6.1 meet drawing, specification, template or job requirements
6.2 meet customer requirements
6.3 have the required dimensional accuracy within specified tolerances
6.4 the form or sharpness of the bend conforms to best practice and or specification without deformation or cracking
6.5 the bend conforms to the required shape/geometry (to the template profile)

Behaviours

Additional Information

You will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall company objectives, such as:

- strong work ethic
- positive attitude
- team player
- dependability
- responsibility
- honesty
- integrity
- motivation
- commitment

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