SEMMME3071

Producing piston engine assemblies

Overview

This standard identifies the competences you need to carry out assembly operations to produce piston engine assemblies, in accordance with approved procedures. You will be required to obtain all the appropriate tools and equipment for the assembly operations, and to check that they are in a safe and usable condition. In carrying out the assembly operations, you will be required to follow laid-down procedures and specific assembly techniques, in order to assemble the various components and unit sub-assemblies into the piston engine assembly.

The assembly activities will also include making all necessary checks and adjustments, to ensure that components are correctly orientated, positioned and aligned, that moving parts have the correct working clearances, that all fasteners are tightened to the correct torque, and that the assembled parts function as per the specification.

Your responsibilities will require you to comply with organisational policy and procedures for the assembly activities undertaken, and to report any problems with the assembly activities, materials or equipment that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to ensure that all tools, equipment and materials used in the installation are correctly accounted for on completion of the activities, and to complete all necessary job/task documentation accurately and legibly. 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 the assembly techniques and procedures. You will understand the piston engine being assembled, and its application, and will know about the equipment, relevant components and fastening devices, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

You will understand the safety precautions required when carrying out the assembly activities. 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 relevant instructions, assembly drawings and any other specifications
3. ensure that the specified components are available and that they are in a usable condition
4. use the appropriate methods and techniques to assemble the components in their correct positions
5. secure the components using the specified connectors and securing devices
6. check the completed assembly to ensure that all operations have been completed and the finished assembly meets the required specification
7. complete the required production documentation
8. deal promptly and effectively with problems within your control and report those that cannot be solved

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. regulations with regard to the substances used in the assembly process
3. the hazards associated with producing piston engine assemblies, and how to minimise them and reduce any risks
4. the personal protective equipment and clothing (PPE) to be worn during the assembly activities
5. 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
6. how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
7. how to identify the components to be used
8. preparations to be undertaken on the components prior to fitting them into the assembly
9. the assembly methods and procedures to be used, and the importance of adhering to these procedures
10. how to complete basic fitting practices meeting company requirements
11. how the components are to be aligned and positioned prior to securing, and the tools and equipment that are used, including jigs and fixtures
12. the various mechanical fasteners that will be used and their method of installation
13. the importance of using the specified mechanical fastening devices for the assembly, and why you must not use substitutes
14. dealing with components or fastening devices incorrectly assembled, damaged, or having other faults
15. the application of sealants and adhesives within the assembly activities, and the precautions that must be taken when working with them
16. the quality control procedures to be followed during the assembly operations
17. how to conduct any necessary checks to ensure the accuracy and quality of the assemblies produced
18. how to detect assembly defects and what to do to rectify them

19. how to move large components and assemblies; the methods and equipment used to transport, handle and lift the components into position; and how to check that the equipment is within its current certification dates.
20. how to check that the tools and equipment to be used are correctly calibrated and are in a safe and serviceable condition
21. the importance of ensuring that all tools are used correctly and within their permitted operating range
22. the importance of ensuring that the completed assembly is free from dirt, swarf and foreign objects
23. the importance of ensuring that all tools, equipment and components are accounted for and returned to their correct location on completion of the assembly activities
24. problems with the assembly operations, and the importance of informing appropriate people of non-conformances
25. 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 assembly 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 follow safe practice/approved assembly techniques at all times
   1.4 check that all cables, extension leads or air supply hoses are in a serviceable condition
   1.5 check that all tools and measuring equipment are within current calibration/certification dates
   1.6 use lifting and slinging equipment in accordance with health and safety guidelines and procedures
   1.7 ensure that all components to be assembled are free from damage, foreign objects, dirt or other contamination before assembling them
   1.8 return all tools and equipment to the correct location on completion of the assembly activities
   1.9 leave the work area and assembly in a safe and appropriate condition on completion of the activities
2. Use five of the following assembly methods and techniques:
   2.1 assembly of components by pressure
   2.2 balancing of components
   2.3 assembly of components by expansion or contraction
   2.4 applying sealants/adhesives
   2.5 aligning components
   2.6 drilling, reaming and riveting
   2.7 setting working clearances
   2.8 electrical bonding of components
   2.9 torque setting of bolts, fasteners, clips, sub-assemblies
   2.10 blue-bedding components
   2.11 securing components using mechanical fasteners and threaded devices
   2.12 applying bolt locking methods (such as split pins, wire locking, lock nuts, stiff nuts, swage nuts)
3. Produce the piston engine assembly by fitting twelve of the following:
   3.1 cylinder block
   3.2 crank shafts
   3.3 seals and gaskets
   3.4 manifolds
   3.5 cylinder heads
   3.6 camshaft assemblies
   3.7 pulleys and sprockets
   3.8 sump pans
   3.9 crank shafts

3.10 timing mechanisms
3.11 belts and chains
3.12 exhaust systems
3.13 fly wheel
3.14 valve mechanisms
3.15 levers and linkages
3.16 pipes and unions
3.17 torque converters
3.18 oil pumps
3.19 injector mechanisms
3.20 fuel pumps
3.21 piston assemblies
3.22 bearings
3.23 sensing devices
3.24 other specific components

4. Carry out all of the following checks for accuracy, using the correct inspection testing equipment:

4.1 dimensions
4.2 orientation
4.3 positional accuracy/timing
4.4 alignment
4.5 freedom of movement
4.6 completeness
4.7 operating/working clearance
4.8 freedom from damage or foreign objects
4.9 bearing end float

5. Produce piston engine assemblies which comply with one of the following quality and accuracy standards:

5.1 BS, ISO or BSEN standards and procedures
5.2 customer standards and requirements
5.3 company standards and procedures
5.4 specific system requirements

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