SEMETS317

Checking and calibrating mechanical inspection equipment

Overview

This standard identifies the competences you need to carry out calibration and setting activities on mechanical inspection equipment, in accordance with approved procedures. You will be required to prepare the equipment and the work area, ensuring that it is safe and free from hazards, to obtain all relevant and current documentation, and to obtain the necessary calibration equipment. You will be required to select the appropriate calibration equipment, based on the type of instruments to be calibrated and the accuracy of the measurements that will be taken. In carrying out the calibration activities, you will be expected to set up, calibrate and check the equipment across its full operating range (where this is appropriate). Equipment to be calibrated could include measuring instruments such as micrometers and verniers, protractors, squares and straight edges, gauges such as plug, ring, gap and length, mechanical test equipment such as torque wrenches, engineers' levels and inclinometers.

Your responsibilities will require you to comply with organisational policy and procedures for the calibration activities undertaken, and to report any problems with the activities 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 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 calibration techniques and procedures to mechanical measuring instruments including, where appropriate, British, European and International standards. You will understand how to use the tools and equipment to calibrate the instruments, in adequate depth to provide a sound basis for carrying out the calibration activities and identifying where instruments do not meet the required calibration specification.

You will understand the safety precautions required when carrying out the calibration 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 legislation and other relevant regulations, directives and guidelines
2. obtain and use the correct equipment to carry out the calibration activities
3. identify and confirm the calibration checks to be made and acceptance criteria to be used
4. correctly set up, check and calibrate the equipment, using approved techniques and procedures
5. record the results, and complete calibration documentation in the appropriate format
6. where appropriate, apply suitable identification to the equipment, stating current date(s) of calibration
7. 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. the specific safety precautions to be taken when checking and calibrating mechanical measuring equipment (such as specific legislation or regulations governing the activities or work area, safe working practices and procedures to be adopted, general workshop safety practice)
2. the health and safety requirements of the work area in which you are carrying out the calibration activities, and the responsibility these requirements place on you
3. Regulations with regard to the substances used in the calibration process
4. the hazards associated with calibrating mechanical measuring equipment, and how they can be minimised
5. the appropriate personal protective equipment and clothing (PPE) to be worn during the calibration activities
6. how and where to obtain the required calibration specifications, and how to check that they are current and complete
7. the general principles of quality assurance systems and procedures
8. preparations to be undertaken before the equipment is checked and calibrated (such as cleaned, visually inspected for damage or missing parts)
9. the effects that the environment may have on the calibration activities (such as where precision measurements are concerned)
10. the use of temperature controlled standards rooms for calibration activities
11. the need to select and use set datum faces, and the effects of taking readings from different datums (such as accumulation of limits leading to errors)
12. the application and uses of the tools and equipment to calibrate mechanical instruments (such as reference grade slip gauges, shadow graphs, cylindrical squares, optical microscopes, special measuring equipment)
13. the typical defects and variations that can be found on mechanical measuring instruments, and how to identify them
14. the need to carry out the calibration checks, and to record the results using the appropriate documentation
15. the procedure to be followed when instruments do not meet calibration requirements
16. the importance of completing calibration documentation, what needs to be recorded

and where records are kept

17.

the extent of your own responsibility, and whom you should report to if you have problems that you cannot resolve

Scope/range

1.

Prepare for the calibration activities, by carrying out all of the following:

1.1 ensure that the work area is in a safe and tidy condition
1.2 ensure that environmental conditions are suitable for the calibration checks being made (such as temperature, cleanliness, humidity)
1.3 obtain and use the correct quality control documentation (such as calibration records, equipment specifications)
1.4 obtain and check the general condition of the measuring instruments to be calibrated
1.5 obtain appropriate calibration/reference equipment for the job in hand

2.

Carry out the calibration of measuring instruments in both of the following systems of measurement:

2.1 imperial units
2.2 metric units

3.

Use five of the following types of calibration equipment:

3.1 reference grade slip gauges
3.2 reference/master thread gauges
3.3 standard reference pieces (such as balls, blocks, wires)
3.4 shadow graph
3.5 angular reference gauges
3.6 floating carriage micrometers
3.7 standard taper gauges
3.8 microscope
3.9 master cylindrical square
3.10 reference/master sine bars
3.11 reference/master bores (such as ring/bore)
3.12 reference/master sine tables
3.13 reference/master bench centres

4.

Check, and where appropriate, set and calibrate ten of the following:

4.1 micrometers (to include external, internal and depth)
4.2 verniers (to include length, height and depth)
4.3 specialist verniers (such as gear tooth)
4.4 specialist micrometers (such as thread)
4.5 height micrometer
4.6 spline gauges
4.7 engineers' square
4.8 radius/profile gauges
4.9 cylindrical square

4.10 workshop gauge blocks
4.11 straight edge
4.12 gap gauge (fixed and adjustable)
4.13 engineers' levels
4.14 plug/hole gauge
4.15 surface tables
4.16 bore gauges (fixed and telescopic)
4.17 angle plates
4.18 groove gauges
4.19 box angle plates
4.20 alignment gauges
4.21 taper gauges
4.22 thread plug gauge
4.23 protractors
4.24 thread ring gauge
4.25 combination squares
4.26 thread depth gauges
4.27 clinometers
4.28 pneumatic gauges
4.29 sine bars
4.30 torque gauge/wrench
4.31 sine tables
4.32 bench centres
4.33 dial test indicators
4.34 roughness standards
4.35 surface finish equipment
4.36 other specific equipment

5.

Check and calibrate mechanical inspection equipment, to include carrying out all of the following:

5.1 obtaining calibration parameters from data records
5.2 setting and using the correct calibration equipment
5.3 following specified or appropriate calibration procedures
5.4 calibrating the instruments to manufacturers' specifications
5.5 apply appropriate coding to calibrated equipment
5.6 recording calibration results accurately and legibly, in the appropriate format
5.7 identifying and recording out-of-specification instruments
5.8 taking appropriate action in respect of instruments that fail to meet calibration specifications
5.9 diagnosing faults during the calibration process (where appropriate)

6.

Complete the calibration documentation, to include **one** from the following, and pass to the appropriate people:

6.1 calibration report
6.2 'equipment withdrawal from service' report
6.3

job card
6.4
customer specific documentation

SEMETS317

Checking and calibrating mechanical inspection equipment

Developed by	Enginuity
Version Number	3
Date Approved	30 Mar 2021
Indicative Review Date	01 Mar 2024
Validity	Current
Status	Original
Originating Organisation	Enginuity
Original URN	SEMETS317
Relevant Occupations	Engineering, Engineering and Manufacturing Technologies, Engineering Technicians
Suite	Engineering Technical Support Suite 3
Keywords	engineering; technical; support; checking; calibration; mechanical; inspection; equipment; micrometers; verniers