

COSVR665 – SQA Unit Code HM5A 04

Install, repair or modify construction resources by heating, welding, brazing, soldering and thermal cutting



Overview

This standard is about

- 1 interpreting information
- 2 adopting safe and healthy working practices
- 3 selecting materials, components, equipment and consumables
- 4 installing, repairing or modifying construction resources by heating, welding, brazing, soldering and thermal cutting

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Performance criteria

- You must be able to:*
- P1 interpret the given information relating to the work and resources to confirm its relevance
 - P2 comply with the given, relevant legislation and official guidance to carry out your work and maintain safe and healthy work practices
 - P3 select the required quantity and quality of resources for the methods of work
 - P4 comply with organisational procedures to minimise the risk of damage to the work and surrounding area
 - P5 comply with the given contract information to carry out the work efficiently to the required specification
 - P6 complete the work within the allocated time, in accordance with the programme of work

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Knowledge and understanding

You need to know and understand:

Performance Criteria 1

Interpretation of information

- K1 the organisational procedures developed to report and rectify inappropriate **information** and unsuitable **resources**, and how they are implemented
- K2 the types of **information**, their source and how they are interpreted
- K3 the organisational procedures to solve **problems** with the **information** and why it is important they are followed

Performance Criteria 2

Safe work practices

You need to know and understand:

- K4 the level of understanding operatives must have of **information** for relevant, current **legislation and official guidance** and how it is applied
- K5 the types of **fire extinguishers** and how and when they are used
- K6 how **emergencies** should be responded to and who should respond
- K7 the organisational **security procedures** for tools, equipment and personal belongings
- K8 what the accident reporting procedures are and who is responsible for making the report
- K9 why, when and how **health and safety control equipment** should be used

Performance Criteria 3

Selection of resources

You need to know and understand:

- K10 the characteristics, quality, uses, sustainability, limitations and defects associated with the **resources** and how defects should be rectified
- K11 how the **resources** should be used and how any **problems** associated with the **resources** are reported
- K12 the organisational procedures to select **resources**, why they have been developed and how they are used
- K13 the **hazards** associated with the **resources** and **methods of work** and how they are overcome

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Performance Criteria 4

Minimise the risk of damage

You need to know and understand:

- K14 how to **protect work** from damage and the purpose of protection
- K15 why **disposal of waste** should be carried out safely and how it is achieved

Performance Criteria 5

Meet the contract specification

You need to know and understand:

- K16 how **methods of work**, to meet the specification, are carried out and **problems** reported
- K17 how **maintenance** of tools and equipment is carried out

Performance Criteria 6

Allocated time

You need to know and understand:

- K18 what the **programme** is for the work to be carried out in the estimated, allocated time and why deadlines should be kept

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Additional Information

Scope/range related to performance criteria

Performance Criteria 1

1. interpretation of drawings, specifications, schedules, method statements, risk assessments, workshop manuals and manufacturers' information related to the work to be carried out

Performance Criteria 2

2. avoidance of risk by complying with the given information relating to at least five of the following
 - 2.1 methods of work
 - 2.2 safe use of health and safety control equipment
 - 2.3 safe use of access equipment
 - 2.4 safe use, storage and handling of materials
 - 2.5 safe use and storage of tools and equipment
 - 2.6 specific risks to health
 - 2.7 safe use, movement and storage of gases

Performance Criteria 3

3. selection of resources associated with own work
 - 3.1 materials, components and fixings
 - 3.2 tools and equipment
 - 3.3 consumables

Performance Criteria 4

4. protection of the work and its surrounding area from damage
5. minimise damage and maintain a clean work space
6. disposal of waste in accordance with current legislation

Performance Criteria 5

7. demonstration of work skills to measure, mark out, fit, heat, prepare, position, secure, join, cut and finish
8. use and maintain hand tools, portable power tools, welding, heating and cutting equipment and ancillaries
9. heat components to given working instructions to achieve at least two of the following:
 - 9.1 free components (thermal shock)
 - 9.2 heat treat
 - 9.3 reduce or remove corrosion
 - 9.4 adjust (localised/spot)

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- 9.5 expansion and contraction fit
- 10. join ferrous and non-ferrous metals to given working instructions using at least two of the following welding techniques:
 - 10.1 oxygen and fuel gas
 - 10.2 manual metal arc
 - 10.3 metal inert gas shielded or metal active gas shielded
 - 10.4 tungsten inert gas shielded
- 11. join metals to given working instructions by brazing using oxygen and fuel gas
- 12. join metals by soldering to given working instructions using at least one of the following techniques:
 - 12.1 oxygen and fuel gas
 - 12.2 iron and flux
 - 12.3 electrical soldering iron
- 13. create at least two of the following joints in metals:
 - 13.1 butt
 - 13.2 lap
 - 13.3 fillet
 - 13.4 corner
- 14. carry out joint work to given working instructions in at least two of the following positions:
 - 14.1 flat
 - 14.2 vertical / horizontal
 - 14.3 vertical
 - 14.4 overhead
- 15. cut materials by thermal cutting using at least one of the following:
 - 15.1 oxygen fuel gas arc
 - 15.2 plasma arc

Performance Criteria 6

- 16. completion of own work within the estimated, allocated time to meet the needs of other occupations and/or client

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Scope/range related to knowledge and understanding

Disposal of waste

- 1 environmental responsibilities, organisational procedures, manufacturers' information, statutory regulations and official guidance

Emergencies

- 2 operative's response to situations in accordance with organisational authorisation and personal skills when involved with
 - 2.1 fires, spillages, injuries
 - 2.2 emergencies relating to occupational activities

Fire extinguishers

- 3 water, CO₂, foam, powder and their uses

Hazards

- 4 those identified by risk assessment, method of work, manufacturers' technical information, statutory regulations and official guidance

Health and safety control equipment

- 5 identified by the principles of protection for occupational use, types and purpose of each type, work situations and general work environment
 - 5.1 collective protective measures
 - 5.2 personal protective equipment (PPE)
 - 5.3 respiratory protective equipment (RPE)
 - 5.4 local exhaust ventilation (LEV)

Information

- 6 drawings, specifications, schedules, method statements, risk assessments, manufacturers' information and current regulations associated with heating, welding, brazing, soldering and thermal cutting

Legislation and official guidance

- 7 this relates to the operative's responsibilities regarding potential accidents and health hazards whilst working in the workplace, below ground level, in confined spaces, at height, with tools and equipment, with materials and substances, with movement/storage of materials and by manual handling and mechanical lifting

Maintenance

- 8 operative care of hand tools, portable power tools, heating, welding and thermal cutting equipment and ancillary equipment

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Methods of work

- 9 application of knowledge for safe and healthy work practices, procedures and skills relating to the method/area of work and materials used to:
 - 9.1 assess requirements for the repair or maintenance of metal by joining, heating and cutting
 - 9.2 validate appropriate ways in which the work should be carried out
 - 9.3 maintain the principles of minimum intervention and reversible alterations
 - 9.4 protect surrounding components
 - 9.5 identify metal properties
 - 9.6 relate equilibrium diagrams to metal types/properties
 - 9.7 purge and vent tanks and containers (gas free certification)
 - 9.8 work with hot materials and components
 - 9.9 identify the advantages and disadvantages of welding processes; oxygen and fuel gas, manual metal arc, metal inert gas or metal active gas and tungsten inert gas shielded
 - 9.10 apply principles and methods of preparing, joining, cutting and heating ferrous and non-ferrous metals (type of joint, material thickness, gaps, measuring, cleaning, position, tacks, pre-treatment, parameters, nozzle, voltage, amperes, wire speed, flow rates, restarts, post-treatment)
 - 9.11 join metals by welding, soldering and brazing
 - 9.12 recognise joint types (butt, lap, fillet, corner)
 - 9.13 inspect joints by non-destructive testing (visual, x-ray and dye penetrates, ultraviolet and ultrasonic) and destructive testing (bend test, tensile, nick break and weld etch)
 - 9.14 finish and dress joints
 - 9.15 cut materials using thermal cutting methods, oxygen fuel gas, plasma arc
 - 9.16 recognise the effects of applying heat to metal (distortion, heat affected zone)
 - 9.17 use and store fuel gases
 - 9.18 recognise and determine when specialist skills and knowledge are required and report accordingly

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- 9.19 use hand tools, portable power tools and equipment
- 9.20 work at height
- 9.21 use access equipment
- 10 team work and communication
- 11 needs of other occupations associated with heating, welding, brazing, soldering and thermal cutting

Problems

- 12 those arising from information, resources and methods of work
 - 12.1 own authority to rectify
 - 12.2 organisational reporting procedures

Programme

- 13 types of progress charts, timetables and estimated times
- 14 organisational procedures for reporting circumstances which will affect the work programme

Protect work

- 15 protect work against damage from general workplace activities, other occupations and adverse weather conditions

Resources

- 16 materials, components and equipment relating to types, quantity, quality, sizes and the sustainability of standard and/or specialist:
 - 16.1 jigs and fixings
 - 16.2 consumables, gases, welding rods/wires
 - 16.3 solders and fluxes
 - 16.4 hand tools, portable powered tools, heating, welding and cutting equipment
- 17 methods of calculating quantity, length, area, volume and wastage associated with the method/procedure to heat, weld, braze, solder and thermal cut construction resources

Security procedures

- 18 site, workplace, company and operative

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