SEMPEO1-30 - SQA Unit Code H02Y 04
Making sand moulds and cores for casting

Overview

This standard covers a range of basic competences that you need, to manually produce sand moulds and cores for casting. It will prepare you for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or it will provide a basis for the development of additional skills and occupational competences in the working environment.

You will be expected to prepare for the production of the moulds and cores by obtaining all the necessary job instructions, materials, tools, equipment and any documentation that may be required.

You will be required to select the appropriate equipment to use, based on the type and size of the pattern, the moulding method employed, and the material to be cast. You will be expected to produce the moulds, using either greensand, chemically bonded gas activated sand, chemically bonded resin/catalyst activated sand or resin bonded heat activated sand. The patterns used will be loose or boarded, circular, square or irregular in shape, and will have projections and internal cavities. The moulds will be produced either in boxes or boxless, as appropriate. On completion of the mould and core making activity, any surplus material will be disposed of safely and correctly. You will be expected to return all tools and equipment to the correct location, and to leave the work area in a safe and tidy condition.

Your responsibilities will require you to comply with health and safety requirements and organisational policy and procedures for the production and preparation of the sand moulds and cores. You will need to report any difficulties or problems that may arise with the moulding and coremaking activities, and to carry out any agreed actions. You will work under a high level of supervision, whilst taking responsibility for your own actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide an understanding of your work, and will enable you to apply appropriate manual sand moulding and coremaking techniques safely for casting. You will understand the manual sand moulding and coremaking process and its application, and will know about the equipment, materials, consumables and tests that are used to confirm that the sand is fit for purpose, to the required 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 sand moulding activities, and when using the associated tools and equipment. You will be required to demonstrate safe working practices throughout. You will also understand your responsibilities for safety, and the importance of taking the

necessary safeguards to protect yourself and others in the workplace.

Specific Standard Requirements
At least one of the moulds produced must combine different operations and moulding techniques, such as producing a mould with a vertical core, forming runner, riser and feeder systems and preparing and closing the mould ready for casting.

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Performance criteria

You must be able to:

P1 work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines
P2 obtain and prepare the appropriate tools, equipment and materials
P3 ensure that the patterns are correctly prepared, sited and positioned ready for the moulding process
P4 ensure that the sand is correctly mixed and milled
P5 carry out the sand moulding and coremaking activities, using the correct methods and techniques
P6 report any difficulties or problems that may arise with the sand moulding and coremaking activities, and carry out any agreed actions
P7 dispose of surplus material safely and correctly
P8 leave the work area in a safe and tidy condition on completion of the sand moulding and coremaking activities

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Knowledge and understanding

You need to know and understand:

K1 the specific safety precautions to be taken when producing and preparing sand moulds for casting (such as wearing full protective clothing and protective equipment (PPE); ensuring adequate ventilation/fume extraction)

K2 the COSHH regulations that apply when dealing with chemically bonded sands, surface coatings, release agents and surface dressings

K3 the hazards associated with producing and preparing sand moulds and cores for casting, and how they can be minimised

K4 the importance of wearing appropriate protective clothing and equipment, and keeping the work area safe and tidy

K5 the types of sand used in the mould and coremaking activities (such as green sand, and chemically prepared sands such as gas activated, resin/catalyst and oil types)

K6 the various types of core boxes that are used (such as solid turnout boxes, split boxes)

K7 the different pattern types used in the moulding process (such as loose and plated), and the jointing methods that are required for the different pattern types

K8 methods of positioning the patterns for correct orientation; centralising and supporting the pattern in the moulding box

K9 the application and use of pattern release agents and core coatings or dressings

K10 methods of filling moulds and core boxes, and of compacting the sands (such as manual filling and compacting and machine filling and compacting), and the precautions to be taken to ensure that the pattern doesn't become displaced during the filling and compacting activities

K11 methods of reinforcement, venting and chilling of the moulds and cores (such as using vent wire and rods, pre- formed shapes, pre-formed wax or nylon)

K12 methods of mould stripping and pattern rapping; removing the pattern without damaging the mould cavity or pattern

K13 methods of cutting and forming downsprues, ingates, riser and feeder systems

K14 why it is necessary to check the moulds and cores prior to commencing core setting and mould closing operations

K15 how to prepare the moulds, and the methods of locating and setting cores in the moulds using core prints, glues and sprigs

K16 the methods of closing and securing the moulds (using weights or clamps), and the dangers/effects of using moulds which are incorrectly closed or clamped

K17 why it is important to keep the pattern and core box equipment clean and

	free from damage, to practice good housekeeping of moulding tools and equipment, and to maintain a clean working area
K18	when to act on your own initiative and when to seek help and advice from others
K19	the importance of leaving the work area in a safe and clean condition on completion of the assembly activities (such as returning tools and equipment to is designated location, cleaning the work area, and removing and disposing of waste)

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Additional Information

Scope/range related to performance criteria

You must be able to:

1. Carry out **all** of the following during the sand moulding and coremaking activities:
   - 1.1 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations
   - 1.2 follow job instructions and apply safe and appropriate sand moulding techniques and procedures at all times
   - 1.3 use the correct tools and equipment for the moulding activity, and ensure that they are safe to use
   - 1.4 ensure that the moulds produced meet the required specification for quality and accuracy
   - 1.5 return all tools and equipment to the correct location on completion of the moulding and coremaking activities

2. Prepare the mould and coremaking equipment for use, to include carrying out **both** of the following:
   - 2.1 visually inspecting the pattern or core box for damage
   - 2.2 applying release agents to the pattern or core box (as applicable)

3. Produce moulds and cores from **one** of the following types of sand:
   - 3.1 greensand (naturally or synthetically bonded)
   - 3.2 chemically bonded resin/catalyst
   - 3.3 chemically bonded gas activated
   - 3.4 resin bonded heat activated
   - 3.5 other type of sand (specify)

4. Produce full or half cores from **one** of the following types of core box:
   - 4.1 solid turnout boxes
   - 4.2 split boxes

5. Produce drag and cope mould parts from **one** of the following types of patterns:
   - 5.1 loose flat back and split type
   - 5.2 plated flat type and split type

6. Produce mould parts, using **one** of the following methods:
   - 6.1 use of moulding boxes

6.2 boxless, using mould location devices

7. Produce moulds and cores using **two** of the following techniques:
   - 7.1 hand tucking and ramming
   - 7.2 mechanical assistance with core consolidation
   - 7.3 curing and drying the cores
   - 7.4 inserting reinforcements (such as wire or bars)
   - 7.5 incorporating vents (such as pre-formed, manually applied)

8. Assemble and finish the moulds, to include carrying out **all** of the following:
   - 8.1 inserting and securing the cores (such as horizontal or vertical location), where appropriate
   - 8.2 forming runner, riser and feeder systems on the mould (such as cut and formed manually, reformed with fixed formers, preformed with loose formers)
   - 8.3 applying mould coatings/dressings (such as by spray, flood, brush or dry)

9. Prepare and close the moulds ready for casting, to include carrying out **all** of the following:
   - 9.1 cleaning and removing foreign bodies and surplus sand from the mould cavity
   - 9.2 carrying out visual checks on moulds for completeness (including all cores and freedom from cracks)
   - 9.3 checking that runner/riser/feeder systems are clean, connected and complete
   - 9.4 applying mould sealant, where appropriate
   - 9.5 locating the moulds using pins, rebates, diabolos or cores, as appropriate
   - 9.6 closing moulds manually or by mechanical means
   - 9.7 securing the moulds using clamps/clips and/or weights

10. Produce sand moulds which meet **all** of the following quality and accuracy standards:
    - 10.1 they are complete and free from obvious defects (such as cracks, broken or damaged mould surfaces)
    - 10.2 they meet the required specification (such as shape, dimensional accuracy)
    - 10.3 they are free from soft spots

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