

Preparing sand for moulding and coremaking

Overview

This standard covers a range of basic competences that you need, to prepare sand and materials used in the production of 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 sand preparation activities by obtaining all the necessary job instructions, materials, tools, equipment and any documentation that may be required.

You will be expected to use manual or mechanised methods to mix the sand, depending on the amount of the processed materials needed. The materials covered include sands, refractory slurries, additives and additions, and you will be expected to perform simple tests on the materials being processed, to confirm that they meet the required specification. On completion of the sand preparation activities, 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 sand preparation activities undertaken. You will need to report any difficulties or problems that may arise with the sand preparation 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 sand mixing techniques and procedures safely. You will understand the different methods of preparing the materials, and will know about the equipment, materials and consumables, 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 mixing activities, and when using the 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.

Specific Standard Requirements

At least one of the sand mixes produced must combine different base materials and mixing techniques.

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Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety legislation, regulations, directives and other relevant guidelines
2. obtain the required materials, and check them for quantity and quality
3. determine how the materials need to be prepared
4. use the appropriate methods and techniques to prepare, mix and mill the materials
5. check that the prepared sand meets the required specification
6. report any difficulties or problems that may arise with the sand preparation activities, and carry out any agreed actions
7. leave the work area in a safe and tidy condition on completion of the sand preparation activities

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Knowledge and understanding

You need to know and understand:

1. the health and safety precautions to be taken, and the procedures to be used, when preparing sands for moulding or coremaking activities
2. the hazards associated with preparing sands, and with the consumables, tools and equipment used, and how to minimise these in the work area
3. the COSHH regulations that apply when dealing with solvents, resins, catalysts and gelling agents
4. the protective equipment (PPE) that is needed for personal protection and, where required, the protection of others
5. the specific workshop environmental conditions that must be observed when mixing sand and using sand additives (such as temperature, humidity, fume/dust extraction systems and equipment)
6. manual lifting techniques, and requirements on acceptable weights to be handled by hand
7. how to obtain the necessary job instructions, and how to interpret their information
8. the tools and equipment used in the sand preparation activities, and how to check that the tools and equipment to be used are in a safe and serviceable condition
9. why it is necessary to check the amounts of materials prior to commencing mixing operations
10. the actions that are needed when materials are found to be below the required amounts
11. why checks need to be made on the materials to be used
12. the effects on the prepared materials if the base product is passed the 'use by' date, is different in content from the company requirement/specification, is added to the mix at the wrong time or at the wrong temperature, or if too little or too much is added to the mix
13. the different processes and machines used to prepare the materials (such as manual, semi and fully automatic)
14. the additions and additives that are used when preparing the materials
15. the reasons why different materials are used for different molten metal alloys
16. why sampling of prepared materials is performed
17. why some prepared materials, which are outside of specification after testing, have to be disposed of
18. the quality control checks to be carried out on the prepared material (such as moisture content, strength, viscosity and freedom from foreign bodies)
19. the problems that can occur with the sand preparation activities, and

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- how they can be avoided
- 20. how to identify prepared material non-conformance (such as dry or wet sand, unmixed sand, thick/thin slurry or unmixed slurry)
- 21. the importance of keeping the equipment clean and free from damage, of practicing good housekeeping of tools and equipment, of maintaining a clean working area, and of carrying out machine start-up and shut-down procedures
- 22. when to act on your own initiative and when to seek help and advice from others
- 23. the importance of leaving the work area in a safe and clean condition on completion of the sand preparation activities (such as returning tools and equipment to the designated location, cleaning the work area, and removing and disposing of waste)

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Scope/range related to performance criteria

1. Carry out **all** of the following during the sand preparation activities:
 1. adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations
 2. use the correct tools and equipment for the activity, and ensure that they are safe to use
 3. follow job instructions and apply safe and appropriate sand preparation techniques and procedures at all times
 4. ensure that the sand mixtures produced meet the required specification for quality and accuracy
 5. return all tools and equipment to the correct location on completion of the sand preparation activities
2. Obtain and prepare **three** of the following materials for the sand mixing operations:
 1. sand
 2. additives
 3. additions
 4. refractory material
3. Produce the mix materials, using **one** of the following methods:
 1. manual mixing
 2. ribbon flow semi-automatic
 3. batch mixing
 4. continuous mixing
 5. combined methods
4. Mix the materials for use, to include carrying out **all** of the following:
 1. measuring out the required amounts of sand for the operations being performed
 2. adding the correct quantities of additives/additions, in the correct ratios, at the appropriate time during mixing
 3. using the correct techniques to mix and mill the materials for the appropriate time
 4. checking that the mixed materials are to the required specification
5. Check the quality of the mixed materials, using **one** of the following methods:

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1. visual inspection
 2. manual testing of material
 3. electronically
6. Carry out **one** of the following checks on the prepared sand:
1. moisture content
 2. viscosity
 3. strength
 4. permeability
7. Complete the sand preparation activities, to include carrying out **all** of the following:
1. confirming that prepared materials are ready for use, and that they comply with required specification
 2. storing the mixed materials in suitable locations
 3. completing all relevant documentation
8. Prepare sand mixes in accordance with **one** of the following:
1. BS or ISO standards and procedures
 2. customer standards and requirements
 3. company standards and procedures
 4. material suppliers standards

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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