

## Producing sand cores manually

---

### Overview

This standard identifies the competencies you need to produce sand cores from solid turn out, spilt and multi-part boxes, using manual and semi-mechanised methods, in accordance with approved procedures. You will be required to select the appropriate equipment to use, based on the type and size of the cores, the coremaking method employed and the metal to be cast. The cores to be produced will be for either ferrous or non-ferrous metal and core making will take place using recognised techniques in jobbing and semi-mechanised foundries.

You will be expected to produce the cores using either oil sand, chemically bonded gas activated sand, chemically bonded resin/catalyst activated sand, or ester silicate bonded sand. The core boxes used will be complex in shape and must include the use of loose pieces. It is expected that the cores being produced will require the use of chills, reinforcements, lifting arrangements and vents. You will determine when the cores will be produced in halves, and complete the core joining operations, where applicable. Special sands will be used, where applicable, to suit core sections and the metal being cast. Repairs to the cores will be performed where necessary. You will make the decisions regarding core coating/dressing, if required and will mix/approve and apply the coating/dressings to company standards.

Your responsibilities will require you to comply with organisational policy and procedures for the coremaking activities undertaken and to report any problems with the coreboxes, sand or equipment in use 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 actions and for the quality and accuracy of the cores that you produce.

Your underpinning knowledge will show a good understanding of your work and will provide an informed approach to applying manual and semi-mechanised core making techniques and procedures. You will understand the different types of sand in use and the additives and additions used in preparing the coremaking material. You will understand the difference in the coremaking processes, using different sands and different types of corebox and coremaking accessories. Your knowledge will enable you to identify sub-standard sand, coreboxes, coremaking equipment and finished cores.

You will understand the safety precautions required when carrying out the coremaking 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.

## Producing sand cores manually

---

### 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. follow the correct component drawing or any other related specifications for the component to be produced
3. obtain and prepare the appropriate tools, equipment and materials
4. carry out the moulding or laying-up activities using the correct methods and techniques
5. produce components to the required specification
6. check that all the required operations have been completed to specification
7. deal promptly and effectively with problems within your control and report those that cannot be solved
8. ensure that work records are completed, stored securely and available to others, as per organisational requirements
9. leave the work area in a safe condition on completion of the activities, as per organisational and legal requirements

## Producing sand cores manually

## Knowledge and understanding

## You need to know and understand:

1. the specific safety precautions to be taken whilst carrying out the activities (including any specific legislation, regulations or codes of practice relating to the activities, equipment or materials)
2. the health and safety requirements of the work area and the activities, and the responsibility these requirements place on you
3. the hazards associated with the activities, and how to minimise them and reduce risks
4. the personal protective equipment and clothing (PPE) to be worn during the activities
5. how to obtain job instructions and interpret the information
6. the different core box types used in the coremaking process (solid turn out, split, multi-part, loose piece and strickle)
7. the different applications for which cores are used in casting production (internal cover and core assembly)
8. the different types of corebox location and clamping devices
9. the different types of core reinforcements (bars, grids, sprigs)
10. why and where chills/denseners are used
11. the different sand coremaking processes used (oil sand and chemically bonded sand gas activated, chemically bonded sand resin/catalyst, and ester silicate sand)
12. the additions and additives that are used when mixing sands and how these affect the coremaking process (oil, starches, chemicals, resins, catalyst, esters, breakdown agents, inhibitors, refractory materials)
13. the effects of using incorrect amounts of additions and additives to core making sands
14. why different types of sand mixes have limited or unlimited life for producing cores
15. how the core box type and configuration can determine the coremaking process and the sand used
16. the application and use of release agents and core coatings
17. the reasons why different release agents are used with different sand and corebox types
18. the type and application of core coating/dressing for different metal alloys
19. the types and applications of core lifting device
20. how to identify core defects (such as soft spots, broken/damaged core surfaces, clagging/sticking, distorted sections, misplaced/displaced chills and ineffective/inadequate core lifting provision)
21. the organisational quality control procedures for producing and inspecting cores (checks for completeness, cleanliness, freedom

## Producing sand cores manually

---

- from foreign bodies, freedom from defects; correct type, application, coverage and thickness of core coatings/dressings; checking core section thickness, core hardness testing)
- 22. to the importance of keeping the core box equipment clean and free from damage, good housekeeping of core making tools and equipment and maintaining a clean working area
- 23. the extent of your own authority and whom you should report to if you have problems that you cannot resolve when making the cores
- 24. how to access, use and maintain information to comply with organisational requirements and legislation

## Producing sand cores manually

---

### Scope/range related to performance criteria

1. Produce cores, carrying out all of the following activities:
  1. confirm that all the required materials and equipment are available and in a safe and usable condition
  2. adhere to health and safety regulations, systems and procedures to realise a safe system of work
  3. comply with job instructions, moulding specifications
  4. use the correct tools and equipment for the coremaking activity
  5. follow the defined coremaking procedures
  6. ensure that the cores produced meet the required specification for quality and accuracy
  7. leave the work area in a safe condition on completion of the coremaking activities
2. Prepare the pattern equipment for use, to include all of the following, as applicable to the corebox type:
  1. visually inspecting the corebox for damage
  2. checking the fit and condition of loose pieces
  3. checking multi-part box locations and condition
  4. applying release agents to the pattern
3. Produce full and half cores, using three of the following types of corebox:
  1. solid turn out
  2. multi-part
  3. containing loose pieces or prints
  4. split
  5. strickle
4. Produce cores using six of the following techniques:
  1. hand tucking and ramming
  2. inserting chills/denseners
  3. mechanical assistance with core consolidation
  4. inserting lifting arrangements (manual, mechanical)
  5. inserting reinforcements (such as wire, bars, grids)
  6. incorporating special sands on core faces
  7. incorporating vents (pre-formed, manually applied)
  8. making provision for interconnecting cores

## Producing sand cores manually

---

5. Produce cores using two of the following types of sand:
  1. oil sand
  2. chemically bonded gas activated
  3. resin bonded heat activated
  4. ester silicate
  5. chemically bonded resin/catalyst
6. Finish/repair the cores using one of the following methods:
  1. patching up/repairing oil sand cores
  2. repairing rigid sand cores using adhesives
7. Apply core coatings/dressings to the moulds, using two of the following methods:
  1. spray flood
  2. brush
  3. flood
  4. dry
8. Produce sand cores which meet all of the following quality and accuracy standards:
  1. cores are complete and free from obvious defects (cracks, broken or damaged core surfaces)
  2. the core meets the required specification (shape, dimensional accuracy)
  3. the core is free from soft spots
  4. core lifting provision is adequate

## Producing sand cores manually

Developed by	Enginuity
Version Number	2
Date Approved	30 Mar 2020
Indicative Review Date	31 Mar 2023
Validity	Current
Status	Original
Originating Organisation	Semta
Original URN	SEMMPF306
Relevant Occupations	Engineering and Manufacturing Technologies, Manufacturing Technologies, Process Operatives, Process, Plant and Machine Operatives
Suite	Materials Processing and Finishing Suite 3
Keywords	Engineering; manufacturing; processing; producing; manually; sand cores; resin bonded sand; chemically bonded sand; greensand; ester silicate