

Overview

This standard identifies the competences you need to produce shells or moulds on wax assemblies, for investment casting, in accordance with approved procedures. You will be required to select the appropriate equipment to use, based on the type and size of the wax assemblies, the method of applying the primary and secondary coatings, the method of wax removal, the metal to be cast and the metal casting method to be used. Production of the shells or moulds will take place, using recognised techniques, in specialist foundries. You will be expected to produce the shells/moulds using pre-mixed refractory slurries, on single waxes or wax assemblies that incorporate the runner/riser/feeder system. You will apply the primary and secondary coatings, either manually or using some form of mechanical assistance, or as a combined operation. The completed shells/moulds will be either air-dried or cured using a gas to activate the coatings. The number of both primary and secondary/stucco coatings will be determined by reference to the company procedures. You will be expected to check the coatings applied and to identify any sub-standard areas of the shell/mould. In certain circumstances, the shell when dried/cured and de-waxed will be backed up in special frames, using refractory materials, prior to casting. On completion of the production of the shells/moulds, you will follow the laid-down procedure for their storage or transfer to the next operation. You will also be expected to carry out any necessary repairs to the shells/moulds and to apply any required coatings/dressings. Your responsibilities will require you to comply with organisational policy and procedures for the shell/mould making activities undertaken and to report any problems with the slurries, coatings 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 to instructions, with minimal supervision, taking personal responsibility for your actions and for the quality and accuracy of the shells/moulds that you produce. Your underpinning knowledge will be sufficient to provide a sound basis for your work and will enable you to adopt an informed approach to applying shell moulding techniques for investment casting. You will have an understanding of the different types of refractory slurries in use and the additives and additions used in preparing the slurry you use to make the shells/moulds. You will also understand the different types of waxes in use, the associated accessories used and their application, in adequate depth to provide a sound background for carrying out the activities to the required specification. Your knowledge will be sufficient to enable you to identify any sub-standard slurry, waxes, equipment and finished shells/moulds. You will understand the safety precautions required when carrying out the shell 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.

Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety, environmental and other relevant regulations, directives and 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 to produce the component 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 and components are 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

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 on 5. how to obtain the job instructions and how to interpret their information 6. how to access, use and maintain information to comply with organisational requirements and legislation 7. the different types of wax pattern used in the ceramic moulding process 8. how the wax pattern type can determine the production process to be used 9. the different types of slurry tanks that are used in the ceramic moulding process 10. the type and application of refractory slurries for different metal alloys 11. the main types of attachment devices, their uses and limitations 12. the different processes used (un-supported and supported shells) 13. the various additions and additives that are used when mixing slurry, and how these affect the moulding process 14. the application and use of shell/mould coatings or dressings 15. the different methods that are used for curing shells/moulds, and why and when they may be used 16. how to identify shell/mould defects (incomplete shells/moulds, broken/damaged surfaces, thin sections or distorted sections) 17. the organisational quality control procedures for producing and inspecting the shells/moulds (cleanliness, completeness, freedom from foreign bodies and defects) 18. to the importance of keeping the waxes and equipment clean and free from damage, good housekeeping of shell/moulding tools and equipment, and maintaining a clean working area 19. the extent of your own authority and whom you should report to if you have problems that you cannot resolve when making the ceramic shells/mould

Scope/range related to performance criteria

1. Produce shells or moulds, carrying out all of the following activities: 1. confirm that all the required materials and equipment are available and are 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 and shell moulding specifications, 4. use the correct tools and equipment for the shell moulding activity 5. follow the defined shell moulding procedures 6. ensure that the shells/moulds produced meet the required specification for quality and accuracy 7. leave the work area in a safe condition on completion of the moulding activities

2. Prepare the wax patterns for use, to include both of the following: 1. visually inspecting the wax pattern for damage 2. applying release agents to the pattern (as applicable) 3. Obtain the slurry supply, and check it using one of the following: 1. visual inspection 2. electronic read-outs 3. reference to technician

4. Produce shells/moulds using one of the following methods: 1. manually 2. automatically 3. combined manual and semi-automatic means 5. Mount waxes on one of the following attachments: 1. handles 2. bars 3. hangers

6. Produce, on single waxes or wax assemblies, both of the following coatings: 1. primary coatings (by successive applications of refractory slurry using the dip process) 2. an outer, coarser, stuccoed coating (using a raining cabinet or fluidised bed) 7. Cure green primary and secondary shells/moulds, using one of the following methods: 1. air (by natural draught or forced draught) 2. gas activated cabinets/areas

8. Check produce shells/moulds meet all of the following quality and accuracy standards: 1. complete and free from obvious defects (cracks, broken or damaged surfaces) 2. required specification (shape, dimensional accuracy) 3. correct shell thickness 9. Sort the finished shells/moulds, placing them into the appropriate designated areas for either: 1. acceptable moulds 2. disposal of substandard moulds

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