SEMMPF219

Producing metallic castings using pressure die processes

Overview

This standard identifies the competences you need to produce castings, using both high and low pressure die casting processes, in accordance with approved procedures. Dies will be mounted on the plattens in the machines, using recognised techniques. You will receive information, either verbally or written, and from these instructions you will be expected to check that the correct die is in place, that there is no damage to the dies or non-conformance which could impair the quality of the castings produced, that machine conditions are set and that molten metal is available for use to enable production to begin. This standard covers high (hot or cold chamber), squeeze and low pressure die casting. The molten metal will either be drawn into the die automatically (hot chamber) or collected from a furnace close to, or integrated into, the die casting machine (cold chamber or squeeze). In all cases, you will be expected to check the temperature of the metal prior to production of the castings. You will then cast the dies in a safe manner, as appropriate and to specified company procedures. Any surplus metal not required will be returned to the collection point or disposed of safely. After allowing a suitable time for the molten metal to solidify, you will remove the casting from the die and visually inspect the product for compliance with the specification. Acceptable castings will be placed in the required locations ready for their next operation. Any sub-standard castings will be held for investigation or returned to the furnace area for re-melting. Your responsibilities will require you to comply with organisational policy and procedures for the die casting activities undertaken. You will report any problems with the operations which have been identified during your production run that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work to verbal or written instructions and to take responsibility for the quality and accuracy of the castings 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 the production of pressure die castings. Your knowledge will enable you to identify when there are faults in the castings produced, and why these faults have occurred. You will know which defects are caused by your own actions and which are outside of your control. You will understand the safety precautions required when carrying out the pressure die casting 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 legislation, regulations, directives and other relevant guidelines 2. follow relevant work instructions and specifications to produce castings 3. confirm that the equipment is set up correctly and ready for the casting activities to maintain an adequate supply of base material 4. control the machine in line with operational procedures 5. produce cast components to the required specification 6. carry out quality sampling checks at suitable intervals and on final castings 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 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 basic parts and functions of a pressure die casting machine (to include dies, die location points, secondary die locations, core locations, die heating arrangements, die coolant supply, connection and operation of the die spray system, furnace type, machine controls, hydraulic, pneumatic and electricity supplies, metal transfer systems, guards and other safety devices) 8. why pre-production checks are carried out on the dies 9. the different types of pressure die casting 10. different methods used to locate dies and associated parts 11. different types of core used in the pressure die casting process 12. the benefits and limitations of the various processes (high pressure hot chamber process, high pressure cold chamber process and squeeze process) 13. the different metals used in producing pressure die castings 14. the pouring temperature range of the metal alloy being cast 15. why castings need time to solidify before removing them from the die 16. why dies need to have release agent applied prior to casting 17. why some dies need to have coolant circulating through the die 18. how to identify casting defects (mis-runs, broken sections, blows, distorted sections, sinks, die-dressing runs, short runs, shrinkage, cracks, inclusions and flash) 19. the organisational quality control checks to be carried out on the prepared pressure die (to include cleanliness, completion, and freedom from foreign bodies and defects) 20. to the importance of keeping the pressure dies and equipment clean and free from damage, good housekeeping of metal handling tools and equipment and maintaining a clean and unobstructed working area 21. the extent of your own responsibilities and to whom you should report if you have problems that you cannot resolve when making pressure die castings 22. the company quality control procedures for producing and inspecting moulds

Scope/range related to performance criteria

1. Prepare the machine for the casting operations, carrying out all of the following: 1. obtain all necessary documents and job instructions for the casting operations being performed 2. adhere to health and safety regulations, systems and procedures to realise a safe system of work 3. check that all molten metal handling/transfer equipment is available and in good order (spoons and ladles) 4. check that all services are connected and that all connections are in good order (power supply, hydraulics, water cooling) 5. check that all machine controls are operational 6. check that die coolant and die spray systems are operational 2. Prepare for the pressure die casting operations, carrying out all of the following activities: 1. checking that the correct die is located in the machine and the machine is complete, clean and free from damage 2. ensuring that die location points are clean 3. checking that secondary die and core locations are clean, free from damage and free to move 4. heating the die to the correct operating temperature 5. applying appropriate die release agents 6. ensuring that the furnace contains sufficient molten metal of the correct specification and at the correct temperature 7. preheating the metal transfer tools where appropriate (to include single bale-out or double shanks/crucibles) 3. Produce pressure die castings, using one of the following methods: 1. high pressure hot chamber 2. squeeze process 3. high pressure cold chamber 4. other specific process 4. Produce castings using two of the following types of pressure die/mould: 1. split die with no secondary die movement 2. split dies with one core 3. split die with one secondary die movement 4. split dies with two or more cores 5. split die with two or more secondary die movements 6. core assembly with external cores 7. split die with no cores 8. core assembly with internal cores 5. Produce castings by mechanical means, carrying out all of the following activities: 1. insertion of cores into die cavity 2. collection of molten metal from the specified location 3. disposal of surplus metal according to company procedures 4. removal of the casting from the die 6. Complete quality checks on the molten metal, carrying out two of the following: 1. molten metal temperature (such as immersion pyrometer, furnace readout, visually or technician approved) 2. cast sample test bars 3. cast samples for chemical analysis 7. Produce pressure die cast components made from one of the following materials: 1. zinc 2. copper based 3. aluminium 4. lead 5. iron 6. precious metal 7. other specific material 8. Complete the visual inspection and segregation of castings for all of the following: 1. acceptable castings 2. scrap castings 3. castings requiring further inspection by supervision 9. Complete all of the following operations at shut down: 1. close down the machine after use 2. check that all systems are failsafe 3. complete the operational log, where appropriate 4. hand over to supervision

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