SEMMPF323

Producing sample/trial castings using a pressure die process

Overview

This standard identifies the competencies you need to produce sample/trial castings using high and low pressure die casting machines, in accordance with approved procedures. Before making any castings, you will be required to inspect the dies/moulds for any damage or non-conformance that could impair the quality of castings produced. You will be expected to check that the correct die/mould is in place and the machine conditions are set correctly. You will need to ensure that molten metal is available and that it is at the correct temperature for the sample/trial production run to begin. You will produce the required number of sample/trial castings, in a safe manner and in line with 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 metal to solidify, you will remove the sample/trial castings from the die/mould and visually inspect the product for compliance with the specification. You will make any necessary adjustments to the machine operating conditions to correct any defects/flaws that have been identified during the inspection process. You will need to make further sample/trial castings, using the revised machine settings, until the castings produced meet the specification requirements.

Your responsibilities will require you to comply with organisational policy and procedures for the pressure die/mould casting activities undertaken and to report any problems with the materials 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 (verbal or written), with a minimum of supervision, taking personal responsibility for your actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide a good understanding of your work and will enable you to adopt an informed approach to the production of pressure die/mould castings. You will understand the different types of pressure die/mould casting machines used. How the dies/moulds are located and secured to the machine platens and how the machine conditions are set to achieve the optimal results. Your knowledge will enable you to identify when there are defects/flaws in the castings produced and why these defects/flaws have occurred. You will also know which defects/flaws are caused by incorrect machine settings and how to adjust the machine operating parameters to eliminate the defects.

You will understand the safety precautions required when operating pressure die/mould casting machines 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.

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. prepare equipment and confirm that it is set up correctly and ready for the casting activities to be carried out
3. maintain an adequate supply of base material
4. manipulate the machine controls safely and correctly in line with operational procedures
5. produce cast components to the required specification
6. carry out quality sampling checks at suitable intervals
7. check completed castings meet specification
8. deal promptly and effectively with problems within your control and report those that cannot be solved
9. ensure that work records are completed, stored securely and available to others, as per organisational requirements
10. 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 the information
6. the basic parts and functions of a pressure die/mould casting machine (to include dies, die location points, secondary die locations, core locations, die heating arrangements, die coolant supply, connection and operation of die spray system, furnace type, machine controls, hydraulic, pneumatic and electricity supplies, metal transfer systems, guards and other safety devices)
7. why it is necessary to carry out pre-production checks on the dies/moulds
8. the different types of pressure die/mould-casting
9. different methods used to locate dies/moulds and associated parts
10. different types of core used in the pressure die/mould casting process
11. the benefits and limitations of the high pressure hot chamber process, high pressure cold chamber process, low pressure and squeeze process
12. the range of machine controls/conditions that can be adjusted and the effect of the controls/conditions on the quality of the castings produced
13. the different metals used in producing pressure die/mould 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/mould
16. why dies need to have release agent applied prior to casting
17. why some dies need to have coolant circulating through them
18. how to identify casting defects/flaws (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/mould (to include cleanliness, complete and freedom from foreign bodies and defects)

20. 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

22. how to access, use and maintain information to comply with organisational requirements and legislation

Scope/range related to performance criteria

1.
Produce sample/trial pressure die castings, carrying out all of the following activities:
- 1.1 comply with job instructions, equipment operating and adjustment documentation, relevant risk assessment documentation
- 1.2 adhere to health and safety regulations, systems and procedures to realise a safe system of work
- 1.3 follow the defined operating procedures leave the work area in a safe condition on completion of the activities

2.
Prepare the machine for use, to include carrying out all of the following checks prior to casting:
- 2.1 die/mould is complete and free from damage or defects/flaws
- 2.2 die/locations are clean, free moving and undamaged
- 2.3 all die/mould securing devices are activated and effective
- 2.4 die/mould faces have been correctly prepared
- 2.5 the correct cores have been inserted into the die/mould cavity (where appropriate)
- 2.6 the die/mould is heated to the appropriate operating temperature
- 2.7 appropriate die release agents are applied
- 2.8 the molten metal is at the correct temperature

3.
Use one of the following pressure die/mould casting techniques:
- 3.1 high pressure hot chamber
- 3.2 high pressure cold chamber
- 3.3 low pressure
- 3.4 squeeze process
- 3.5 other specific process

4.
Produce castings using two of the following types of pressure die/moulds:
- 4.1 split die with no secondary die movement
- 4.2 split dies with one core
- 4.3 split die with one secondary die movement
- 4.4 split dies with two or more cores
- 4.5 split die with two or more secondary die movements
- 4.6 core assembly with external cores
- 4.7 split die with no cores
- 4.8 core assembly with internal cores

5.

Produce die castings from one of the following metals:

5.1 aluminium
5.2 zinc
5.3 magnesium
5.4 precious metal
5.5 copper base
5.6 lead
5.7 iron
5.8 other appropriate material

6.

Visually inspect sample/trial castings and identify both of the following:

6.1 castings which meet the required specification
6.2 castings which have defects/flaws

7.

Complete the sample/trial casting operations, carrying out all of the following:

7.1 completing all relevant documentation
7.2 disposing of surplus metal in line with company procedures
7.3 close down the machine and checking all systems are failsafe

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