SEMMPF332

Finishing materials by applying coatings by electroless nickel plating

Overview

This standard identifies the competencies you need to carry out electroless nickel coating activities to various substrates, in accordance with approved procedures. You will be required to access the appropriate specifications, to check that these are thecurrent issue and to extract all necessary information in order to carry out the electroless nickel coating operations. You will be required to carry out all necessary preparations to the base materials prior to plating them and this will include such items as cleaning, degreasing, masking and other appropriate treatments. You will be expected to prepare and adjust the plating and cleaning solutions and where required, heat treatment to give the desired surface coating properties. You will be expected to identify any plating defects and to carry out the necessary actions and adjustments to equipment and plating solutions in order to correct them. You will need to carry out tests on the components to ensure that deposited layers meet the specification requirements. Your responsibilities will require you to comply with organisational policy and procedures for the electroless nickel plating activities undertaken and to report any problems with these activities or with the materials and equipment used, 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 own 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 provide an informed approach to applying electroless nickel plating methods, techniques and procedures. You will understand the electroless nickel plating process and its application, in adequate depth to provide a sound basis for carrying out the activities, correcting faults, and ensuring the finished components are to the required specification. Your knowledge will also include effluent treatment for the waste streams from the plating solutions and associated processes. You will understand the safety precautions required when carrying out the preparation and electroless nickel plating operations. You will be required to demonstrate safe working practices throughout and will understand the responsibility you owe to yourself and others in the workplace and towards the environment.

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 job instructions and specifications 3. ensure the material surfaces to be treated are prepared for the finishing operations 4. check that the finishing equipment and treatment solutions are set up and maintained at required operating conditions and levels 5. carry out finishing according to operating procedures and to meet specifications 6. check that the treated workpiece achieves the required characteristics and meets the finishing specifications 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. the types of specifications that are used during the electroless plating activity 6. how to assess component suitability for electroless plating (to include methods of handling, methods of pre-treatment, the most efficient and appropriate method of application) 7. the basic principles of operation of the electroless nickel plating equipment used 8. how to set up and check that the electroless nickel plating plant, equipment and solutions are fit for purpose 9. the properties of electroless plated deposits 10. the mechanisms of corrosion protection arising from an electroless plated deposit as a surface layer 11. the properties of different passivation and the effects of sealants and torque control additives 12. how to decide whether components are suited to rack or barrel plating, jigging or wiring techniques 13. how to identify different solution formulations to meet deposit requirements, 14. the use of heat treatment to increase deposit hardness 15. how to prepare and clean substrates 16. measurement and control of electroless nickel deposits requirements 17. how to maintain and clean equipment, including the use of 5S or similar techniques 18. the properties of electroless nickel deposits 19. the suitability of various substrate materials for electroless nickel plating 20. methods for checking coated surfaces for visual defects and other specified characteristics 21. the importance of maintaining solution concentrations and temperatures and pH levels within specification limits 22. how to test coated components for specification requirements 23. how to assess when solutions are spent; safe disposal of old solutions; correct cleaning of tanks 24. preparation of new solutions 25. the importance of agitation and various methods of achieving this 26. the jigging methods, construction of jigs, baskets or barrels to obtain satisfactory deposits 27. the extent of your own responsibility and whom you should report to if you have problems that you cannot resolve 28. how to access, use and maintain information to comply with organisational requirements and legislation

Scope/range related to performance criteria

1. Finish materials by applying coatings using electroless nickel plating methods, carrying out all of the following activities: 1. use the correct issue of process and other related specifications 2. adhere to health and safety regulations, systems and procedures to realise a safe system of work 3. ensure that the equipment is correctly prepared for the plating operations 4. ensure that any meters and gauges to be used are within their calibration periods 5. clean all tools and equipment on completion of the plating activities 6. complete the production documentation (such as condition/pre-treatment of substrates, coating material preparation, equipment settings, confirmation of standard of finish) 7. leave the work area in a safe and clean condition 2. Apply electroless nickel plating to one of the following substrates: 1. mild steel 2. brass 3. plastics (prepared for plating processes) 3. Measure and correct two of the following conditions in the plating solutions: 1. levels of basic constituents of plating solutions 2. contaminants in plating solutions 3. temperature of plating solutions 4. agitation rates in plating solutions 5. pH (acidity/alkalinity) of plating solutions 4. Measure and correct two of the following conditions in the cleaning solutions: 1. total and free alkalinity of cleaners 2. effectiveness of rinsing 3. acidity and contamination levels in cleaning solutions 4. temperature of cleaners 5. effectiveness of inhibition in acid pickling process 6. contamination levels in cleaners 5. Prepare plant and equipment for electroless nickel plating activities, by carrying out three of the following: 1. cleaning out process tanks with nitric acid 2. rinsing the tank thoroughly prior to production 3. cleaning and/or changing filters 4. preparing solutions from basic constituents and demineralised water 5. calculating the correct addition rates of replenishment materials 6. adding replenishment materials manually, or adjusting automatic dosing equipment 7. assessing when the solution is spent and needs to be replaced 6. Use one of the following methods for locating the components for electroless nickel plating: 1. wiring 2. jigs with integral masking 3. specialised jigs 4. barrels 5. jigs and masking of components 6. baskets or frames 7. Check the plated components for one of the following characteristics: 1. deposition rate 2. hardness of deposit after heat treatment 3. hardness of deposit 4. co-deposition of contaminants with deposits 8. Check the plated component for two of the following: 1. thickness of deposit 2. ductility of deposit 3. corrosion resistance 4. phosphorus content 5. presence of nodules or blisters 6. brightness of deposit 7. complete coating coverage 8. porosity 9. Strip poorly applied coatings from one of the following substrates: 1. steel 2. brass 10. Check electroless nickel coatings applied to components comply with one of the following quality and accuracy standards: 1. military or aviation standards 2. current industry standards and codes of practice 3. international standards 4. company standards and requirements 5. customer standards and requirements

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