This standard identifies the competencies you need to carry out hard chromium plating processes to various substrates, in accordance with approved procedures. You will be required to access the appropriate specifications, to check that these are of the latest issue and to extract all necessary information in order to carry out the hard chromium plating 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, jigging techniques and other appropriate treatments.

You will be expected to prepare and adjust the plating solutions to give satisfactory deposits at optimal productivity levels. 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 their specification requirements.

Your responsibilities will require you to comply with organisational policy and procedures for the hard chromium 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 hard chromium plating methods, techniques and procedures. You will understand the hard chromium plating processes and their 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 include effluent treatment for the waste streams, from the hard chromium plating processes and their associated pre-treatments.

You will understand the safety precautions required when carrying out the preparation and hard chromium plating operations. You will need to take particular account of the hazards associated with chromic acid and to take actions that minimise the risks of using this material. 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 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
5. how local exhaust ventilation and/or spray suppressants maintain the concentration of chromic acid mist above plating tanks, within occupational exposure limits
6. the importance of regular medical checks by a qualified practitioner and in-company checks for skin and forearm lesions, or other problems the suitability of various substrates for hard chromium plating; the need for pre-polishing or back etching in some applications
7. how to identify various coating specifications and how to advise on correct coating thicknesses to meet specific service conditions (such as for machine tool components and hydraulic rams)
8. properties of hard chromium electro-deposits
9. the basic principles of operation of the hard chromium plating equipment
10. how to set up and check that the hard chromium plating plant, equipment and solutions are fit for purpose
11. how to manufacture conforming anodes or jigs to hold anodes for specific applications
12. the correct jigging of components (such as type of electrodes, number of electrodes, position of electrodes)
13. how to make up plating solutions and pre-treatment solutions
14. how to clean and prepare substrates and check for cleanliness
15. how to examine components for visible defects prior to plating them
16. jigging methods, construction of jigs and spacing of components to give satisfactory deposits and maintain optimal productivity levels
17. the importance of tight temperature control during the hard
chromium plating operations
18. the role of agitation in maintaining temperature stability and the possible effect on deposit distribution
19. how to test coated components for specification compliance
20. how to identify and correct processing faults how to remove poorly applied coatings without damaging substrates
21. how to remove contaminants from plating solutions; care and maintenance of solutions and filters
22. how to clean jigs, contacts, anodes and other equipment close to the chromium plating tanks
23. how to carry out effluent treatment
24. the effects of contaminants in plating solutions and how to remove these
25. the extent of your own responsibility and whom you should report to if you have problems that you cannot resolve
26. how to access, use and maintain information to comply with organisational requirements and legislation
1. Finish materials by hard chromium plating, carrying out all of the following:
   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 are within their calibration periods
   5. clean all tools and equipment on completion of the plating activities
   6. complete the production documentation (condition/pre-treatment of substrates, coating material preparation, equipment settings, confirmation of standard of finish, production run sheets)
   7. leave the work area in a safe and clean condition

2. Measure and correct two of the following hard chromium plating conditions:
   1. basic constituents in chromium plating solutions
   2. solution temperature
   3. chromic acid concentration, by specific gravity
   4. plating efficiencies
   5. contaminants in plating solutions
   6. surface tension of solution (to assess spray suppressant concentration)

3. Measure and correct two of the following problems:
   1. total and free alkalinity of cleaners
   2. activity of etching solution
   3. contamination levels in cleaners
   4. level of neutraliser in drag out solution
   5. acidity and contamination levels in pickling solutions
   6. effectiveness of rinsing
   7. temperature of cleaners

4. Carry out two of the following activities:
1. remove and clean down anodes and contacts
2. prepare plating solutions from basic salts
3. make additions of materials, safely, to chromium plating solutions
4. check that all anodes are working correctly and that all components being processed are electrically connected

5. Measure one of the following:
   1. adhesion of deposit to substrate
   2. porosity of coatings
   3. thickness of deposits
   4. colour of deposit
   5. brittleness of deposit
   6. presence of deposit

6. Carry out one of the following activities:
   1. grind or polish chromium deposits to a specified thickness
   2. mask components to prevent deposition of metal in specified areas
   3. use go/no-go gauges to assess whether the correct deposit thickness has been applied
   4. carry out thickness distribution measurements across work envelopes, or in several places on larger components

7. Secure components for processing, using one of the following methods:
   1. wiring securely
   2. specialised jigs orientating components in the prescribed manner for chromium plating
   3. clamping
   4. using jigs with integral masking

8. Strip chromium from one of the following substrates:
   1. steel
   2. copper
   3. brass

9. Check coatings applied to components by hard chromium plating, 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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