

Applying protective metallic coatings by spraying

Overview

This standard identifies the competences you need to apply protective metallic coatings using metal spraying techniques, 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 metal coating operations. You will be required to check that all surfaces to be coated have been prepared in accordance with the process specification and that any necessary exclusion, containment, masking, protection and ventilation requirements are implemented. You will be expected to select the appropriate and/or specified equipment and to check that it is in a safe and usable condition. You will set up and make any necessary adjustments to the spraying equipment and consumables to give satisfactory deposits. You will be expected to apply the metallic protective coatings in a number of shipyard and onboard environments. You will need to carry out tests on the components to ensure that deposits meet their specification requirements.

Your responsibilities will require you to comply with organisational policy and procedures for the metal spraying 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 metallic protective coatings by spraying methods. You will understand the spraying procedures and techniques used and their application and will know about the surface preparation requirement of the steel substrate and the wire to be sprayed, in sufficient depth to provide a sound basis for carrying out the activities, identifying and correcting faults and for ensuring that the coated surfaces are to the required standard.

You will understand the safety precautions required when carrying out the metal spraying 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.

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Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. ensure the material surfaces to be treated are suitably prepared for the finishing operations to be carried out
3. check that the finishing equipment and treatment solutions are set up and maintained at satisfactory operating conditions and levels
4. carry out the treatment process in accordance with operating procedures and the component specification requirements
5. ensure that the treated workpiece achieves the required characteristics and meets the finishing specification
6. deal promptly and effectively with problems within your control and report those that cannot be solved
7. dispose of waste and excess materials in line with agreed organisational procedures
8. shut down the finishing equipment to a safe condition on completion of the processing activities
9. complete relevant documentation in line with organisational procedures

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Knowledge and understanding

You need to know and understand:

1. the safe working practices and procedures to be observed when spraying metallic coatings (such as general workshop and site safety, appropriate personal protective equipment (PPE), protecting other workers from the effects of the work, safety in enclosed/confined spaces, working at height, atmospheric controls)
2. statutory requirements, risk assessment procedures and relevant requirements of HASAWA, COSHH, (such as Approved Codes of Practice (ACOP), The Workplace (Health, Safety and Welfare) Regulations, The Noise at Work Regulations, the Confined Space Regulations, The Water Resources Act)
3. the health and safety requirements of the work area in which you are carrying out the metal spraying activities and the responsibility they place upon you
4. how to recognise and deal with emergencies and the procedures to be followed (such as methods of safely evacuating and closing down of compartments in the case of fire or other major incident, first aid, fire fighting and resuscitation of personnel)
5. the hazards associated with the use of metal spray guns, in particular the hazards associated with gas bottles and gas lines
6. the use of appropriate personal protective equipment (PPE)
7. the requirements for working in confined spaces and the importance of emergency procedures and safe systems of work (including permits to work, Required Air Quantities (RAQs) and local exhaust ventilation (LEV)) to maintain safe conditions; the provision of adequate and safe lighting and avoidance of sources of ignition
8. the correct handling and storage of gas cylinders (including manual handling and use of cylinder trolley, leak detection procedures, relevant British Compressed Gas Association (BCGA) codes of practice, cylinder identification, gas pressures, cylinder and equipment safety features, emergency shutdown procedures)
9. the various types of specifications that are used during the metal spraying operations
10. how to carry out currency/issue checks of the specifications you are working with
11. the importance of maintaining appropriate environmental conditions for the application of the metallic coatings
12. the basic principle of operation of the metal spraying equipment being used
13. the importance of adequate and complete surface preparation
14. what surface preparations need to be carried out on the materials prior to spraying them
15. the characteristics of sprayed metallic coatings for surface

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- protection
16. the various metal spraying mediums and consumables that are used and their safe handling and storage requirements
 17. how to check that the metal spraying plant, equipment and mediums are fit for purpose
 18. how to check that the equipment is safe to use and is operating correctly
 19. the selection of the appropriate spray tip for the task to be carried out
 20. how to adjust the metal spraying parameters to ensure the workpiece achieves the correct coverage and depth of coating
 21. the requirement to not exceed the specified maximum separation between the gun and the air control unit
 22. the requirement for the gas flows and pressures specified for the spraying equipment
 23. the requirement to ensure that a neutral flame is achieved
 24. the requirement to observe recommended spraying speeds
 25. how to secure and to maintain maximum spraying speeds
 26. the importance of checking air and gas lines and connections for integrity; the need to safeguard the 'run' of any line; the importance of not leaving gas bottles on board on completion of the task or shift
 27. the techniques required for the application of metallic coatings to a variety of surfaces (such as horizontal and vertical banding)
 28. the problems that can occur with metal spraying and how they can be rectified
 29. the identification of faults (such as spatters) in application, their causes and correction
 30. how to test the sprayed/coated components for specification compliance (to include magnetic film thickness gauge and weighing techniques)
 31. minimising and handling waste materials (including the environmental impact of the materials you are using and the minimisation of this impact)
 32. the organisational quality systems used and the coating standards to be achieved
 33. the extent of your own responsibility and whom you should report to if you have problems that you cannot resolve

Scope/range related to performance criteria

1. Carry out **all** the following during the metal spraying process:
 1. use the correct issue of metal spraying process documentation and other related specifications
 2. use copies of relevant health and safety documentation, COSHH sheets and risk assessments
 3. use appropriate personal protective equipment (PPE) during the preparation activities, ensuring that it is in good condition and used correctly
 4. confirm that all necessary husbandry, exclusion zones and containment arrangements are in place and are adequate
 5. confirm that appropriate emergency arrangements are in place for any confined space or other hazardous work (such as adequate air supply, local exhaust ventilation and adequate and safe lighting)
 6. carry out any necessary masking
 7. provide weather protection for the areas to be sprayed (where appropriate)
 8. ensure that environmental conditions meet the requirements for the application of the metal coating (such as surface temperature, air humidity)

2. Prepare the metal spraying equipment for operation, to include carrying out **all** of the following:
 1. check that the spraying equipment is in a safe and usable condition
 2. ensure that gas bottles are stowed in a safe and authorised location
 3. check that all gas lines are correctly connected and without leaks
 4. ensure that gas hose are correctly routed and adequately protected
 5. check that the correct type and size of spray tip is fitted to the spray gun
 6. check that wire feed mechanisms operate correctly
 7. set operating parameters (such as feed/deposition rates, gas pressures, gas flow rates, air pressures)
 8. check that safety devices are in place and that they operate correctly

3. Carry out metal spraying operations using **one** of the following types of material:
 1. zinc
 2. aluminium

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3. other specific material
 4. Apply metal spray coatings to marine structures incorporating **five** of the following features:
 1. corners (such as edges, outside corners, obscured corners)
 2. inclined surfaces
 3. curved surfaces
 4. vertical flat surfaces
 5. horizontal flat surfaces
 6. overhead surfaces
 7. slender components
 8. round parts
 5. Apply metal spray coatings in **two** of the following situations:
 1. confined spaces (such as tanks)
 2. bilges (in machinery spaces)
 3. weather decks
 4. upper deck components
 5. weatherwork
 6. ducting (such as vent systems)
 6. Apply metal spray coatings that achieve **all** of the following:
 1. correct film thickness
 2. smooth surface, free from spatter
 3. compliance with contractual specification
 4. correct banding
 5. complete coverage of the surface to be coated
 7. Check coating thickness using **one** from the following:
 1. magnetic film thickness gauge
 2. ensuring the correct/specified weight of metal is applied per unit area
 8. Carry out metal spraying activities in accordance with **one** of the following standards:
 1. BS or ISO standards and procedures
 2. customer (contractual) standards and requirements
 3. company standards and procedures
 4. product manufacturer's recommendations
 5. recognised compliance agency/body's standards
 9. Reinstate the work area on completion of the metal spraying application, to include carrying out **all** of the following:
 1. clean and return all tools, equipment and excess materials

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2. remove protection and exclusion arrangements (if no longer required)
3. leave the work area in a safe and clean condition
4. complete all relevant documentation (such as condition/pre-treatment of substrates, coating material preparation, equipment settings, confirmation of standard of finish)

Behaviours

Behaviours:

You will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall company objectives, such as:

- strong work ethic
- positive attitude
- team player
- dependability
- responsibility
- honesty
- integrity
- motivation
- commitment

