SEMCOMP316

Bonding composite mouldings

Overview

This standard identifies the competences you need to bond composite mouldings (such as cured panels, moulds, components and jigs), in accordance with approved procedures. You will be required to use appropriate drawings, specifications and documentation to bond advanced composites materials, using the correct techniques.

You will produce a range of bonded composite mouldings, incorporating a variety of features and using a range of techniques and processes. Bonded mouldings produced will include a range of resin, fibre and adhesive materials.

Your responsibilities will require you to comply with organisational policy and procedures for the bonding activities undertaken, and to report any problems with the bonding activities, equipment or materials 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 composite bonding techniques and procedures. You will understand the bonding techniques used, and their application, in adequate depth to provide a sound basis for carrying out the activities, correcting faults, and ensuring the work produced is to the required specification.

You will understand the safety precautions required when carrying out the composite bonding activities 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 and other relevant regulations, directives and guidelines
2. follow the relevant bonding procedure specification and job instructions
3. check that the materials to be bonded and bonding agents comply with the specification
4. correctly prepare the parent materials and bonding agents in line with the bonding specification
5. carry out the bonding and curing operations using the specified processes and techniques to position, bond and retain the materials in their correct locations
6. ensure that any equipment used to maintain surface contact during the bonding activities is set up and used correctly
7. achieve bonds of the required quality and within the specified dimensional accuracy
8. complete relevant documentation
9. deal promptly and effectively with problems within your control and report those that cannot be solved
10. leave the work area in a safe and appropriate condition on completion of the activities

Knowledge and understanding

You need to know and understand:

1. the health and safety precautions to be taken and procedures used when working with composite materials, consumables, tools and equipment in the specific work area
2. the hazards associated with carrying out composite bonding activities, and with the composite materials, consumables, tools and equipment used, and how to minimise these and reduce any risks
3. the protective equipment (PPE) that is needed for personal protection and, where required, the protection of others
4. the application of COSHH regulations in relation to the storage, use and disposal of composite materials and consumables
5. the specific environmental conditions that must be observed when producing composite mouldings (such as temperature, humidity, fume/dust extraction systems and equipment)
6. how to extract and use information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS, ISO or BSEN standards) in relation to work undertaken
7. how to interpret drawings, lay-up manuals, imperial and metric systems of measurement, workpiece reference/datum points and system of tolerancing
8. the quality procedures used in the workplace to ensure production control (in relation to currency, issue, meeting specification) and the completion of such documents
9. the conventions and terminology used for bonding (such as gel points, cure times, bond thickness, bond strength, peel strength)
10. the different types of resins, reinforcement, catalysts, accelerators and additives used, and their applications
11. the different types of fibre materials, weave patterns, orientations, their combinations and applications
12. the different bonding agents, and their applications
13. correct methods of storage and handling of bonding agents
14. the methods of preparation for bonding different materials
15. mixing procedures and ratios for two-part pastes, and the associated working times
16. methods of determining if the bonded component has cured correctly

17. methods of application for different bonding agents
18. methods of retaining the bond during curing, and their applications
19. the tools and equipment used in bonding activities, and their care, preparation and control procedures
20. the identification and rectification of bond defects
21. the problems that can occur during the bonding process (including defects such as contamination and distortion)
22. how defects can be overcome during the bonding activity
23. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

Scope/range related to performance criteria

1. Carry out all of the following during the bonding activities:
    1. obtain and use the appropriate documentation (such as job instructions, drawings, material data sheets, specifications, planning and quality control documentation)
    2. adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
    3. provide and maintain a safe working environment for the composite bonding activities
    4. obtain and check that all tools and equipment to be used are in a safe and usable condition
    5. follow safe practice/approved composite bonding techniques and procedures at all times
    6. return all tools and equipment to the correct location on completion of the bonding activities
    7. segregate and dispose of waste materials using the correct procedure

2. Carry out all of the following activities when preparing for the bonding activity:
    1. check that mouldings are correct and complete
    2. check for any defects in the mouldings
    3. check that bonding materials are within life
    4. check availability of ancillary materials required
    5. select the correct equipment for the activity
    6. check that the equipment is suitable for use
    7. identify and protect the moulding and bonding materials in the work area
    8. check that bonding materials are correct and complete

3. Bond composite mouldings using techniques for two of the following:
    1. one-part pastes
    2. two-part pastes
    3. film adhesives
    4. syntactic films

4. Prepare bonding surfaces using four of the following methods:
    1. peel plies

2. templates
3. abrading
4. abrasive blasting
5. water cleaning
6. solvent cleaning
7. dry fitting
8. acid etching
9. priming
10. surface masks
11. other (to be specified)

5. When bonding composite mouldings, use two of the following methods:
    1. bonding sequences
    2. shimming materials
    3. laying film adhesives
    4. mixing adhesives
    5. wetting-out by brush
    6. applicator gun
    7. bead sizing
    8. fillet sizing

6. During curing, retain the bond using two of the following:
    1. weighting down
    2. bonding jigs
    3. pinning joins
    4. clamping
    5. press
    6. vacuum bagging
    7. other (to be specified)

7. Cure bonded joins using one of the following methods
    1. room temperature
    2. oven
    3. autoclave
    4. heated tools/moulds
    5. heat mats
    6. heated press
    7. curing lamps
    8. infrared heating

9. electro-magnetic inductance
10. micro-wave
11. other (to be specified)

8. Bond composite mouldings for two of the following:
    1. sandwich panels
    2. butt joins
    3. overlap joins
    4. joggle joins
    5. return joins
    6. tongue and groove
    7. strap join
    8. other (to be specified)

9. Bond composite mouldings to include four of the following features:
    1. internal corners
    2. external corners
    3. horizontal surface
    4. vertical surface
    5. double curvature
    6. concave surface
    7. convex surfaces
    8. joggle details
    9. return surfaces
    10. inserts
    11. fixtures
    12. other specific feature

10. Use techniques for bonding three of the following materials to the composite moulding:
    1. other composites
    2. metals
    3. ceramics
    4. polymers
    5. natural materials
    6. other (to be specified)

11. Bond composite mouldings using adhesives suitable for two of the following resin types:

1. bio resin
2. thermoplastic
3. polyester
4. vinyl ester
5. epoxy
6. phenolic
7. bismaleimide
8. cyanate ester
9. other (to be specified)

12. Bond composite mouldings using adhesives suitable for two of the following fibre types:
    1. natural fibre
    2. thermo plastic
    3. glass
    4. aramid
    5. carbon
    6. hybrid
    7. other specific types

13. Bond a range of mouldings in compliance with one of the following standards:
    1. BS, ISO or BSEN standards and procedures
    2. customer standards and requirements
    3. company standards and procedures
    4. recognised compliance agency/body standards

14. Complete the relevant documentation, to include one of the following:
    1. production documentation
    2. quality control documentation
    3. job cards

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

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