SEMAUT3029

Bonding vehicle composite components

Overview

This standard identifies the competences you need to bond vehicle composite mouldings (cured panels, body mouldings, structural sections, cover panels, trim panels), 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 that 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 that 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. prepare the parent materials and bonding agents in line with the bonding specification
5. position and bond the materials in their correct locations using appropriate processes and techniques
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. 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 these and reduce any risks
4. the personal protective equipment and clothing (PPE) to be worn during the activities
5. the application of current regulations in relation to the storage, use and disposal of composite materials and consumables
6. the specific workshop environmental conditions the must be observed when bonding composite mouldings (such as temperature, humidity, styrene levels to threshold limits, fume/dust extraction systems and equipment)
7. how to extract and use information from engineering drawings and related specifications (to include symbols and conventions, currentindustry standards and codes of practice) in relation to work undertaken
8. how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
9. quality procedures used in the workplace to ensure production control (in relation to currency, issue, meeting specification)
10. conventions and terminology used for bonding (such as gel points, cure times, bond thickness, bond strength, peel strength)
11. different types of composite resin systems, fibres, reinforcements, and their merits
12. different bonding agents and their merits
13. the correct methods of storage and handling of bonding agents
14. methods of preparation for bonding different materials
15. mixing procedures and ratios for two-part pastes, and their associated working times
16. methods of application for different bonding agents
17. methods of retaining the bond during curing, and their merits
18. tools and equipment used in bonding activities, and their care, preparation and control procedures
19. the identification and rectification of bond defects
20. the problems that can occur during the bonding process (including defects such as contamination and distortion)
21. how defects can be overcome during the bonding activity
22. the extent of your own responsibility and to whom you should report

if you have problems that you cannot resolve

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

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, planning and quality control documentation, material/adhesive data sheets, specifications,)
    2. adhere to procedures or systems in place for risk assessment, hazardous substances, 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 the correct tools and equipment for the activity, and check that they are in a safe, tested 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 composite bonding activities
    7. dispose of waste materials in accordance with approved procedures
2. Prepare for the bonding activity:
    1. check that mouldings are correct and complete
    2. check availability of ancillary materials required
    3. check for any defects in the mouldings
    4. select the correct equipment for the activity
    5. check that bonding materials are within life
    6. check that 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. abrading
3. water cleaning
4. dry fitting
5. priming
6. templates
7. bead blasting
8. solvent cleaning
9. acid etching
10. surface masks
11. laser ablation

5. Bond composite mouldings, using three of the following methods:

    1. dry fitting
    2. mixing adhesives
    3. laying film adhesives
    4. bonding sequences
    5. wetting-out by brush
    6. oven curing
    7. shimming materials
    8. applicator gun
    9. heated press

6. Retain the bond during the curing process using two of the following:

    1. weighting down
    2. pinning joins
    3. clamping
    4. press
    5. vacuum bagging
    6. bonding jigs

7. Bond composite mouldings using techniques for two of the following:

    1. sandwich panels
    2. butt joins
    3. overlap joins
    4. joggle joins
    5. return joins

8. Bond composite mouldings using techniques for two of the following:

    1. flat surfaces
    2. shaped surfaces
    3. internal surfaces
    4. external surfaces

9. Use techniques for bonding three of the following materials to the composite moulding:

    1. metals
    2. ceramics
    3. plastics
    4. wood-based materials
    5. other composites

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

    1. polyester
    2. epoxy
    3. phenolic
    4. bismaleimide
    5. cyanate ester
    6. vinyl ester

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

    1. polyethylene
    2. glass
    3. aramid
    4. carbon
    5. other specific types

12. Check that bonded mouldings comply with all of the following quality and accuracy standards:

    1. meet company standards and procedures
    2. dimensionally accurate within specification tolerances
    3. bonded components are mechanically secure and are free from damage or defects

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