SEMMME239

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 follow the appropriate instructions, drawings, specifications and documentation to bond composite materials, using the correct approved production 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 composite 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 to instructions, 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 be sufficient to provide a good understanding of your work, and will provide an informed approach to applying composite bonding techniques and procedures. You will have an understanding of the bonding techniques used, and their application, in adequate depth to provide a sound basis for carrying out the activities, recognising faults, and ensuring the work output is to the required specification.

You will understand the safety precautions required when carrying out the 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:

P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

P2 follow the relevant bonding procedure specification and job instructions

P3 check that the materials to be bonded and bonding agents comply with the specification

P4 prepare the parent materials and bonding agents in line with the bonding specification

P5 carry out the bonding operations using the specified processes and techniques to position and bond the materials in their locations

P6 ensure that any equipment used to maintain surface contact during the bonding activities is set up

P7 achieve bonds of the required quality and within the specified dimensional accuracy

P8 deal with problems within your control and report those that cannot be solved

Knowledge and understanding

You need to know and understand:

K1 how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
K2 the importance of wearing the appropriate personal protective equipment (PPE), and of keeping the work area clean and tidy
K3 the application of COSHH regulations in relation to the storage, use and disposal of composite materials and consumables
K4 the specific environmental conditions that must be observed when bonding composite mouldings
K5 how to extract and use information from engineering drawings and related specifications in relation to work undertaken
K6 how to use imperial and metric systems of measurement, work piece reference points and system of tolerance
K7 quality procedures used in the workplace to ensure production control
K8 conventions and terminology used for bonding
K9 the function fibre materials, weave patterns, orientations play in the production of mouldings
K10 correct methods of storage and handling of bonding agents
K11 methods of preparation for bonding different materials
K12 methods of application for different bonding agents
K13 methods of retaining the bond during the curing process, and their merits
K14 the tools and equipment used in the bonding activities, and their care, preparation and control procedures
K15 the importance of following the correct mixing procedures and having the correct ratios for two-part pastes and their associated working times
K16 the methods used to determine if the bonded component has cured
K17 the identification of bonding defects
K18 the common issues that can occur during the bonding process
K19 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:

1.1. use the appropriate documentation (such as job instructions, drawings, material data sheets, specifications, planning and quality control documentation)

1.2. adhere to procedures or systems in place for risk assessment, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work

1.3. maintain a safe working environment for the composite bonding activities

1.4. check that all tools and equipment to be used are in a safe and usable condition

1.5. follow safe practice/approved composite bonding techniques and procedures at all times

1.6. return all tools and equipment to the correct location on completion of the bonding activities

1.7. segregate and dispose of waste materials using the correct procedure

1.8. leave the work area in a safe and appropriate condition on completion of the activities

1.9. complete relevant production documentation

2. Carry out four of the following activities when preparing for the bonding activity:

2.1. check that mouldings are correct and complete

2.2. check for any defects in the mouldings

2.3. confirm that bonding materials are within life

2.4. check availability of ancillary materials required

2.5. select the correct equipment for the activity

2.6. confirm that the equipment is suitable for use

2.7. identify and protect the moulding and bonding materials in the work area

2.8. check that bonding materials are correct and complete

3. Bond composite mouldings, using techniques for one of the following:

3.1 one-part pastes

3.2 two-part pastes

3.3 film adhesives

3.4 syntactic films

4. Prepare bonding surfaces, using two of the following methods:

4.1 peel plies
4.2 abrading
4.3 water cleaning
4.4 dry fitting
4.5 priming
4.6 templates
4.7 abrasive blasting
4.8 solvent cleaning
4.9 acid etching
4.10 surface masks
4.11 other specific method

5. Use two of the following methods when bonding the composite mouldings:
5.1 bonding sequences
5.2 shimming materials
5.3 laying film adhesives
5.4 mixing adhesives
5.5 wetting-out by brush
5.6 applicator gun
5.7 bead sizing
5.8 fillet sizing

6. Use one of the following to retain the bond during the curing process:
6.1 weighting down
6.2 pinning joins
6.3 clamping
6.4 press
6.5 vacuum bagging
6.6 bonding jigs
6.7 other specific method

7. Cure bonded joins using one of the following methods:
7.1. room temperature
7.2. oven
7.3. autoclave
7.4. heated tools/moulds
7.5. heat mats

7.6. heated press
7.7. curing lamps
7.8. infrared heating
7.9. electro-magnetic inductance
7.10. micro-wave
7.11. other (to be specified)

8. Bond composite mouldings for one of the following:
8.1. sandwich panels
8.2. butt joins
8.3. overlap joins
8.4. joggle joins
8.5. return joins
8.6. tongue and groove
8.7. strap join

9. Bond composite mouldings to include three of the following features:
9.1. internal corners
9.2. external corners
9.3. horizontal surface
9.4. vertical surface
9.5. double curvature
9.6. concave surface
9.7. convex surfaces
9.8. joggle details
9.9. return surfaces
9.10. inserts
9.11. fixtures

10. Use techniques for bonding one of the following materials to the composite moulding:
10.1. other composites
10.2. metals
10.3. ceramics
10.4. polymers
10.5. natural materials
10.6. other specific technique

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

11.1. bio resin
11.2. thermoplastic
11.3. polyester
11.4. vinyl ester
11.5. epoxy
11.6. phenolic
11.7. bismaleimide
11.8. cyanate ester
11.9. other specific resin

12. Bond composite mouldings using adhesives suitable for one of the following fibre types:

12.1. natural fibre
12.2. thermo plastic
12.3. glass
12.4. aramid
12.5. carbon
12.6. hybrid
12.7. other specific type

13. Bond a range of mouldings in compliance with one of the following standards:

13.1. BS, ISO or BSEN standards and procedures
13.2. customer standards and requirements
13.3. organisational standards and procedures
13.4. recognised compliance agency/body standards

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