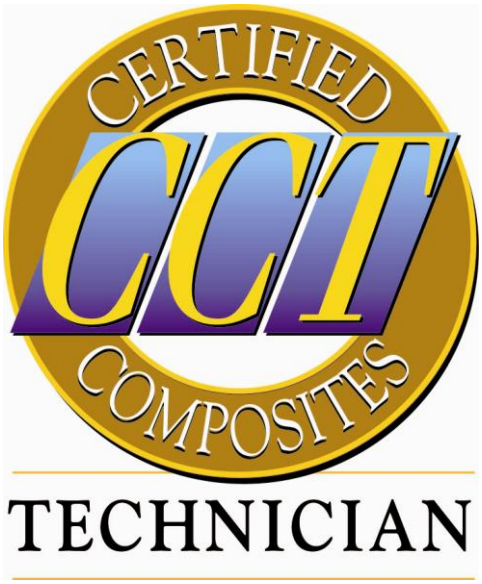
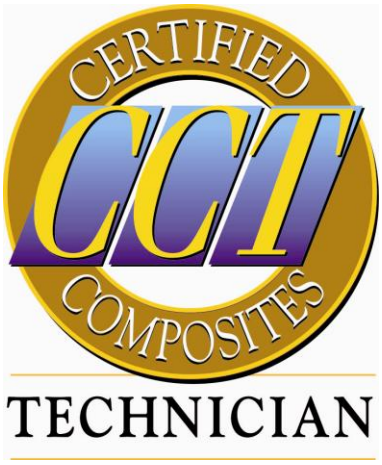


Re-Certification Exam

Version 2.0 - 2011



Re-Certification Exam

This open book test consisting of forty questions is based on the eight articles in the re-certification workbook. Please read each article carefully and answer the questions for each section. Each correct answer is scored 2-points. As an open book test a grade of 85% is required to pass the exam.

Step 1 – Review the re-certification workbook

Step 2 – Complete the re-certification application

Step 3 – Complete the test sections and place **all** answers on *answer sheet*

Step 4 – Send **ONLY** the completed *Application sheet, answer sheet* and renew fee to ACMA (Please note: Your credentials cannot be processed without the renewal fee)

Step 5 – Upon successful completion of the test (scoring an 85% or higher) your credentials will be revaildated.

If the exam score does not qualify for revalidation, the exam workbook will be returned to the applicant for remedial review. The applicant can then correct and resubmit the test. If an applicant fails the re-certification test on the second attempt, his/her CCT credentials will not be revalidated. The candidate will be required to requalify by taking the original CCT exam.

Return Completed Exam and Re-Certification Fee to:

American Composites Manufacturers Association
CCT Re-Certification Program
1010 N. Glebe Rd., Suite 450
Arlington, VA 22201

CCT Re-Certification Application
(Print Clearly)

Applicant Information

First Name: _____ MI: _____ Last Name: _____

Primary Email: _____

Home Address:_____

City: _____ State: _____ ZIP: _____

Home Phone:_____

Company Information

Company: _____

Address: _____

City: _____ State: _____ ZIP: _____

Phone: _____ Fax: _____

Payment Information

Renewal Fees: $50 members, $100 nonmembers

Check: _____ Amount: $_____

Credit Card: □VISA □ MasterCard □ American Express

Please fill out the Full Credit Card Information on the following page to pay with your credit card.

VISA MASTERCARD AMERICAN EXPRESS

Full Credit Card Account Number:	
Expiration Date	
Security Code **3 Digit Code (Visa, MC)** **4 Digit Code (AMEX)**	
Billing Address	
Date	
Phone Number	

Federal Tax ID (52-1144059) ACMA Fax: 703-525-0743

I hereby authorize ACMA to charge my credit card for the payment of items below. I agree to pay for all requested registrations, enrollments and other items/services from ACMA, and agree that ACMA can charge my card for an amount different than what is below if the amount below is not correct.

Card Holder Name:_____
Signature:_____
Last Four Numbers of Authorized Card:_____
Amount to be charged: $_____
Description of Charge/ Names of CCT Candidates Paid For: _____
_____
_____
_____

Name of Company Payment should be applied:_____
Internal Use Only:
Date Processed: _____ Initials: _____
Notes: _____

CCT

For office use only
SCORE

2.5 pt each
Certification Date _____
Expiration Date _____

Instructions: Place correct answer(s) next to the corresponding number

Mailing Information

Please note: *The address you provide below is where your results will be sent.*

Today's Date ___/___/____

First Name: _____ MI: _____ Last Name: _____

Company Name/Institution:_____

Mailing address (cannot be a PO BOX):_____

City: _____ State: _____ ZIP: _____ Country: _____

1. _____ **16.** _____ **31.** _____

2. _____ **17.** _____ **32.** _____

3. _____ **18.** _____ **33.** _____

4. _____ **19.** _____ **34.** _____

5. _____ **20.** _____ **35.** _____

6. _____ **21.** _____ **36.** _____

7. _____ **22.** _____ **37.** _____

8. _____ **23.** _____ **38.** _____

9. _____ **24.** _____ **39.** _____

10. _____ **25.** _____ **40.** _____

11. _____ **26.** _____

12. _____ **27.** _____

13. _____ **28.** _____

14. _____ **29.** _____

15. _____ **30.** _____

CCT Re-Certification Exam

Section 1 – Defining Composites

1. The term composite is derived from the Latin root word *componere* which means:

   [ ] A. To compare
   [ ] B. Many elements
   [ ] C. To bring together

2. Indicate three of the material combinations that qualify as composites under the broad definition.

   [ ] A. Wood

   [ ] B. Aluminum alloy

   [ ] C. Adobe brick

   [ ] D. Steel belted tires

   [ ] E. Cement blocks

3. What is "aspect ratio"?

   [ ] A. Fiber diameter

   [ ] B. Length to width

   [ ] C. The amount of material in a mixture

4. Particles (fillers) in a resin matrix do not effectively transfer loads because they have:

   [ ] A. Lower density

   [ ] B. Uniform shape

   [ ] C. Low aspect geometry

5. The precise definition of composites states that: "… the reinforcement has an aspect ratio that enables the transfer of loads between fibers, and the fibers are chemically bonded to the resin matrix."

   [ ] A. True

   [ ] B. False

Section 2 – Open Molding Laminating Techniques

6. The terms “Hand Lay-up” and “Spray-up” are derived from:

   [ ] A. The method of resin application

   [ ] B. The method of applying the fiberglass reinforcement

   [ ] C. The method of laminate roll-out

7. The five objectives of the FRP laminating process include: Properly placing the reinforcement:; Saturating the reinforcement with the proper amount of resin; Removing entrapped and compacting the laminate; and (indicate the two remaining objectives):

   [ ] A. Achieving the proper resin to glass ratio

   [ ] B. Dissolving the sizing on the glass reinforcement

   [ ] C. Maintaining resin viscosity throughout the process

   [ ] D. Properly curing the laminate

8. Deviation from the specified resin to glass ratio in a laminate, will affect:

   [ ] A. Structural properties

   [ ] B. Laminate weight

   [ ] C. Cost

   [ ] D. All of the above

9. The primary means of determining glass to resin ratio *during* the laminating process is:

   [ ] A. Visually

   [ ] B. Measuring resin and glass input

   [ ] C. An ignition test

10. The technical term for compacting a laminate during the roll-out process is:

    [ ] A. Laminate thickness reduction

    [ ] B. Laminate consolidation

    [ ] C. Laminate densifying

Section 3- Understanding Polyester Resin Curing

11. The fundamental chemical reaction that takes place when curing polyester resin is called:

    [ ] A. Crosslinking

    [ ] B. Hardening

    [ ] C. Drying

12. The crosslinking reaction is at maximum activity from the time initiator is added to the resin to the time of :

    [ ] A. Maximum Barcol hardness development

    [ ] B. Peak exotherm

    [ ] C. Endotherm termination

13. Indicate three items that can cause a poor initial crosslinking reaction:

    [ ] A. Low initiator levels

    [ ] B. Lack of effective roll-out

    [ ] C. Low shop temperature

    [ ] D. Improper level of promoter or inhibitor

    [ ] E. Improper resin viscosity

14. If a laminate is not properly cured in the initial stages, it will eventually fully cure given enough time.

    [ ] A. True

    [ ] B. False

15. The minimum acceptable shop temperature for properly curing polyester resin is:

    [ ] A. 50^0F

    [ ] B. 60^0F

    [ ] C. 70^0F

16. The use of so-called “summer catalyst” or “half-strength initiator” at the same percentage as a standard initiator may result in _____ .

    [ ] A. Undercure

    [ ] B. An adequate cure in hot weather

    [ ] C. Increased resin exotherm

Section 4 – Reference Guide to RTM and VIP

17. RTM and VIP are most often associated with:
    - [ ] A. High volume molding
    - [ ] B. Intermediate volume molding
    - [ ] C. Custom molding

18. VIP tooling can be virtually identical to open molding tooling.
    - [ ] A. True
    - [ ] B. False

19. What type of process equipment is required for RTM?
    - [ ] A. A vacuum pump
    - [ ] B. Mix/metering injection equipment
    - [ ] C. A pre-forming machine

20. Cycle times for VIP are generally _____ than hand lay-up or spray-up:
    - [ ] A. Faster
    - [ ] B. The same as
    - [ ] C. Slower

21. In the VIP process fiber loading of up to _____by weight is possible.
    - [ ] A. 50%
    - [ ] B. 40%
    - [ ] C. 70%

Section 5 – Controlled Spraying

22. From this list the most significant contributor to styrene emissions is:
    - [ ] A. Temperature
    - [ ] B. Overspray
    - [ ] C. Laminate thickness

23. There are three elements to controlled spraying. These include spraying at the lowest applicable pressure, using proper spray gun handling techniques and:

[ ] A. The use of low-HAP resins

[ ] B. The exclusive use of flow coaters

[ ] C. The use of close-capture flanges on molds

24. Overspray creates a wet footprint area around a mold.

[ ] A. The emissions from this thin film are significant

[ ] B. The emissions from this thin film are inconsequential

[ ] C. Overspray creates fewer emissions than the laminate on the mold.

25. The proper spray gun orientation to the mold surface is:

[ ] A. At a low angle for better coverage

[ ] B. Perpendicular to the mold surface

[ ] C. With at least 50% of the spray pattern off the mold to insure complete coverage

26. When setting up a spray gun there are exceptions to using minimum pressure.

[ ] A. True

[ ] B. False

Section 6 – Efficient Non-Atomized Application

27. What best describes emissions generation during the transfer stage of the open molding process?

[ ] A. High peak concentrations over an extended period

[ ] B. Low concentrations because of the short duration

[ ] C. High peak concentrations over a short time

28. Transfer losses are distributed as evaporative loss and _____.

[ ] A. Overspray loss

[ ] B. Pressure loss

[ ] C. Atomization loss

29. What best describes the major factor influencing emissions during the open mold gel coating and laminating processes:

[ ] A. Laminate or gel coat film thickness

[ ] B. Laminate or gel coat film surface area during the curing stage

[ ] C. Laminate or gel coat surface area plus the surface area of the spray pattern

30. During spraying operations, fan pattern particle size has an effect on surface area compared to the volume of material dispensed. One droplet 100 microns in diameter has the same volume as 100 droplets of 10 microns in diameter. The surface area of the 100 individual droplets is _____ larger than the single large droplet.

[ ] A. 1000 times

[ ] B. 50 times

[ ] C. 10 times

31. When comparing non-atomized resin application to non-atomized gel coat application, the flow rate, applied thickness, and initiator mixing of resin application is _____ than gel coat application:

[ ] A. Less critical

[ ] B. More critical

[ ] C. More complicated

Section 7 – MACT Misconceptions

32. Under the MACT standard most companies will have to adopt closed molding to comply.

[ ] A. True

[ ] B. False

33. A facility emissions limit (i.e., pounds of HAP emitted per year) is a function of:

[ ] A. MACT limitations

[ ] B. A negotiated State operating permit

[ ] C. The HAP content of allowable resins

34. Facilities must use specific MACT compliant materials under the standard.

[ ] A. Yes, only certain approved materials can be used.

[ ] B. MACT compliance is contingent on combinations of materials, additives, and application methods.

[ ] C. Only low HAP resins are permitted.

35. MACT compliance options include the use of low HAP resins, vapor suppressants and _____ .

[ ] A. Non-atomized application

[ ] B. Internal mix spray guns

[ ] C. Closed molding

Section 8 – Electrostatic Discharge in Composites Operations

36. The primary hazard of ESD is the potential for creating _____ .

[ ] A. a shock

[ ] B. mold cracking

[ ] C. a fire

37. The ability of a material to shed or attract electrons is known as:

[ ] A. Charge potential

[ ] B. Conductivity

[ ] C. R-factor

38. Spray guns develop _____ because of the friction of fluid moving through the lines.

[ ] A. an electrostatic charge

[ ] B. pressure

[ ] C. polarization

39. Because typical FRP molds are non-conductive they can build a high charge on the surface.

[ ] A. True

[ ] B. False

40. What environmental conditions create to highest potential for ESD?

[ ] A. High humidity conditions

[ ] B. Low humidity conditions

[ ] C. High air flows