Fusion Bonded Epoxy: Application and Inspection Level 1 Exam

Exam Preparation Guide

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Introduction

The Fusion Bonded Epoxy: Application and Inspection Level 1 exam is designed to assess whether a candidate meets the minimum qualifications expected of someone with foundational knowledge in fusion bonded epoxy. The exam consists of 120 multiple-choice questions, primarily based on the Fusion Bonded Epoxy: Application and Inspection course Body of Knowledge.

Test Name	Fusion Bonded Epoxy: Application and Inspection Level 1
Test Code	FBE1
Total Seat Time*	2 hours 30 minutes
Number of Exam Items†	120
Format	Computer Based Testing (CBT)

* Total Seat Time includes 10 minutes for a Tutorial and Non-Disclosure Agreement and 2 hours 20 minutes for the Exam.

† Number of Exam Items includes 100 scored items and 20 unscored items.

Note: A **Pass/Fail** result is provided at the end of the exam.

Target Audience

Credential holders possess fundamental knowledge in the application, inspection, evaluation, and testing of plant-applied single- and dual-layer external fusion bonded epoxy (FBE) coatings for pipelines. Credential holders understand the physical and chemical properties of FBE, the coating application process, and essential quality control measures during and after application. Typical candidates for this certification may include:

- Line workers involved in the application, testing, and inspection of FBE coatings
- Facility managers and supervisors overseeing coating operations
- QA/QC personnel tasked with maintaining coating standards
- Auditors evaluating coating processes and performance
- Asset owners responsible for FBE-coated infrastructure

Requirements

Certification Requirements

- FBE Course
- Ethics Course
- Core Exam

FBE Course
• Successful completion of the Fusion Bonded Epoxy: Application and Inspection course
Ethics Course
Successful completion of **either**: • AMPP Ethics for the Corrosion Professional course **OR** • Submit a third-party ethics training program for review and approval as an equivalent
Core Exam
• A passing score on the Fusion Bonded Epoxy: Application and Inspection Level 1 exam

Upon successful completion of all requirements, the candidate will be awarded the **Fusion Bonded Epoxy: Application and Inspection Level 1** certification.

Certification Renewal Requirements

- Recertification application required every 3 years, subject to approval
- 18 months of related work experience since last renewal
- 8 hours per year of ongoing professional development hours (PDHs) from two categories since last renewal

Recommendations

Experience
One year of FBE-related work experience
Familiarity with Standards
NACE SP0394

Exam Blueprint

Incoming Material Evaluation 10%

- Review relevant documents (e.g., purchase orders, standards, specifications) for pipes.
- Receive and inspect pipes (e.g., verify pipe size, wall thickness, traceability markings).
- Check for contamination on the substrate.
- Verify product labels and quality certificates of raw materials from the manufacturer.
- Test raw materials used for coating application.
- Confirm storage conditions for the raw materials.
- Prevent cross-contamination of raw materials.

Surface Preparation 25%

Pre-Preparation

- Verify environmental conditions.
- Perform blotter test.
- Identify and remove surface contaminants and address defects.
- Implement pretreatment processes.
- Confirm abrasive type and abrasive blast method.

In-Process

- Preheat substrate surfaces.
- Perform abrasive blast cleaning.
- Remove deleterious materials from inside the pipe.

Post-Blast

- Measure surface profile.
- Remove defects (e.g., slivers, lamination) from the surface profile.
- Verify cleanliness and dust test.
- Conduct soluble salt test.
- Verify the acid concentration of the acid wash solution.
- Confirm the dwell time of the acid wash.
- Perform post cleaning of the acid wash with pressure washing.
- Perform inspections of the pipe after the acid wash.

Heating and Coating Application 20%

- Confirm the dew point of compressed air for the fluidized bed.
- Perform visual inspection on the powder system.
- Monitor and maintain appropriate substrate temperature.
- Monitor and adjust coating thickness.
- Confirm the cure time before the water quench.

Post Application 20%

Online Testing

- Measure dry film thickness.
- Verify the voltage setting of the holiday detector.
- Verify calibration of the measurement tools and equipment.
- Measure the coated surface temperature.
- Perform holiday testing.
- Verify the cutback dimensions and adhesion test.
- Add markings for traceability.
- Identify holidays or defects for repair.
- Identify possible causes of common defects.

Repair

- Repair holidays or damaged coating.
- Check environmental conditions.
- Prepare the substrate for repairs.
- Apply approved repair material.
- Measure dry film thickness on the repair areas.
- Perform holiday testing on the repair areas.
- Perform a visual inspection on the repair areas.

Damage Mitigation

- Plan, verify, and determine protective measures for handling.
- Plan, verify, and determine protective measures for storage.
- Plan, verify, and determine protective measures for transportation.

Production Sample Testing and Evaluation **25%**

- Prepare and label the production test ring samples.
- Complete necessary documentation for the samples.
- Perform porosity evaluation.
- Perform interface contamination evaluation.
- Perform flexibility testing.
- Perform cathodic disbondment testing.
- Record, interpret, and report results.
- Perform remedial actions if necessary.

Exam Format and Preparation

Item Format

The exam consists of 120 multiple-choice items. Of these, 100 items are scored and count toward your final result. The remaining 20 items are unscored and are included to gather statistical data for future exam development. You will not be able to distinguish scored from unscored items.

Some items are presented as direct questions, while others use a complete-the-sentence format. In all cases, there is only one best answer. Items are randomized for each candidate.

Exam content is largely based on the Fusion Bonded Epoxy: Application and Inspection course. To enhance exam preparedness, one year of relevant experience and familiarity with the *NACE SP0394* standard are recommended.

Sample Items (Questions)

1. Which of the following is an electrical device that locates discontinuities in a protective coating?

    A. Holiday detector
    B. Dry film thickness gauge
    C. Dew point meter
    D. Micrometer

2. During the interface contamination test, what is the maximum allowable percentage of contamination?

    A. 15%
    B. 20%
    C. 25%
    D. 30%

3. Which of the following tests is used to assess supplied compressed air?

    A. Holiday
    B. Conductivity
    C. Thickness
    D. Blotter

4. What type of pipe material is FBE applied directly to?

    A. Polyvinylchloride (PVC)
    B. High density polyethylene (HDPE)
    C. Steel
    D. Concrete

Answer Key

1. A
   Reference: Course Manual

2. D
   Reference: NACE SP0394

3. D
   Reference: Course Manual

4. C
   Reference: Course Manual

Study Resources and Reference Materials

Training

- Fusion Bonded Epoxy: Application and Inspection course

Course Material

- Fusion Bonded Epoxy: Application and Inspection course manual

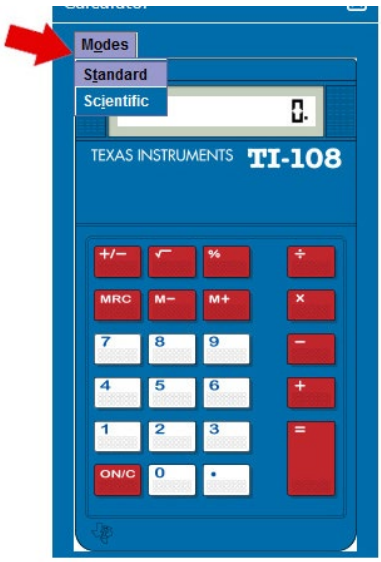
Standards

- NACE SP0394, Application, Performance, and Quality Control of Plant-Applied Single-Layer Fusion Bonded Epoxy External Pipe Coating

Calculators

CBT exams contain a built-in calculator. Students will have access to either a TI Standard or TI Scientific calculator for use during the CBT Exam.

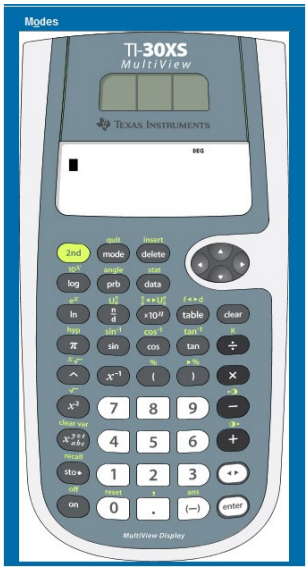
Standard Calculator



Standard Mode Functions

Add	+	
Subtract	-	
Multiply	X	
Divide	÷	
Negative	(-)	
Percentage	%	
Square Root	√	Example: 4 √
Reciprocal (Inverse)	x	Example: 1 ÷ 2 =
Store value to variable	M+	Example: 3 * 5 = M+
Access variable	MRC	Example: 7 + MRC =
Clear variable	M- MRC	

Scientific Calculator



Scientific Mode Functions

Add	+	
Subtract	-	
Multiply	X	
Divide	÷	
Negative	(-)	
Percentage	2nd [%]	
Square Root	√	Example: 2nd √ 4 enter
Reciprocal (Inverse)	X^{-1}	Example: 2 X^{-1} enter
Store value to variable	sto▶ X^{yzt}	Example: 3 * 5 enter sto▶ X^{yzt} enter
Access variable	X^{yzt} or 2nd [recall]	Example: 7 + 2nd [recall] enter enter

Numeric Notation

Standard (Floating Decimal) Notation (digits to the left and right of decimal	mode menu options **NORM** SCI ENG e.g. 123456.78 FLOAT 0 1 2 3 **4** 5 … e.g. 123456.7800
Scientific Notation (1 digit to the left of decimal and appropriate power of 10)	mode menu options NORM **SCI** ENG e.g. 1.2345678*105
Engineering Notation (number from 1 to 999 times 10 to an integer power that is a multiple of 3)	mode menu options NORM **SCI** ENG e.g. 123.45678*103

Fractions

Simple fractions	n/d
Mixed numbers	2nd [Un/d]
Conversion b/w simple fraction and mixed number	2nd [n/d ◄► Un/d]
Conversion b/w fraction and decimal	2nd [f ◄► d]

Powers, roots, and inverses

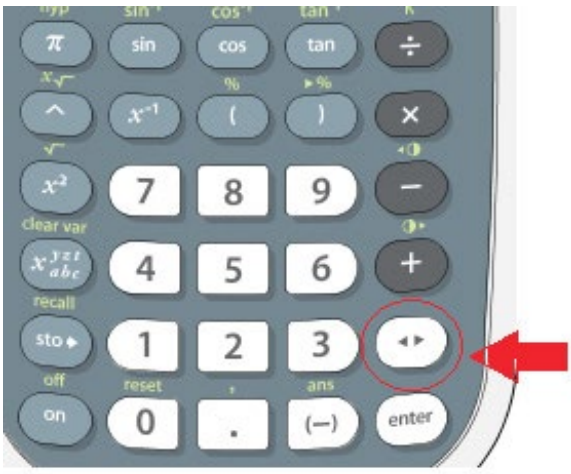
Square a value	x^2	
Cube a value	^	
Raise value to specified p wer	^	Example (2^4) 2 ^ 4
Square root	2nd [√]	Example (√16): 2nd [√] 16
Reciprocal	x^{-1}	Example (n^{th} root): 5^{th} root of 8: 5 2nd [^{x}√] 8

Pi

PI (π)	π

Toggle

The scientific calculator might show the results of certain calculations as a fraction - possibly involving pi or a square root. To convert this kind of result to a single number with a decimal point, you will need to use the “toggle answer” button circled in the picture below. Pressing this button will change the display from a fractional to a decimal format.



Answer toggle

Press the ◄► key to toggle the display result between fraction and decimal answers, exact square root and decimal, and exact pi and decimal.

Example

Answer toggle	2nd [√] 8 enter	√8 2√2
	◄►	√8 2√2 2√2 2.828427125

If you find this onscreen calculator difficult to use, raise your hand and ask the TA to provide you with a hand-held calculator. If available, you will be provided with a scientific or non-scientific calculator. Candidates are not permitted to bring their own calculator into the testing room.