

Job-task analysis (JTA) for ACI Certification of Concrete Strength Testing Technician

ASSESSMENT METHODS:

Written exam—general (understand concepts) or working (know specific facts) knowledge

Performance exam— perform specific tasks (or describe verbally, where allowed)

RESOURCES:

ASTM C617/617M – Standard Practice for Capping Cylindrical Concrete Specimens

ASTM C1231/1231M – Standard Practice for Use of Unbonded Caps in Determination of Compressive Strength of Hardened Concrete Cylinders

ASTM C39/39M – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

ASTM C78/78M – Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)

ASTM C617/617M – Standard Practice for Capping Cylindrical Concrete Specimens

- Understand scope of practice
- Understand significance and use of practice
- Know dimensional requirements of capping plates
- Know criteria for sulfur melting pots
- Understand use of Table 1 for strength and thickness requirements of capping materials
- Understand requirements for qualification of high-strength gypsum plaster
- Understand requirements for qualification of sulfur mortar caps
- Know and perform the procedures for capping hardened concrete specimens
- Know how to protect and store specimens after capping
- Understand safety issues related to melting pots
- Know the requirements for and perform alignment check of cylinders
- Know and perform the procedure for planeness check of caps, including the proper reporting of results
- Know and perform the procedure for thickness measurements of caps, including the proper reporting of results

ASTM C1231/1231M – Standard Practice for Use of Unbonded Caps in Determination of Compressive Strength of Hardened Concrete Cylinders

- Understand scope of practice
- Know compressive strength limits for the use of unbonded caps
- Understand significance and use of unbonded caps
- Know dimensional, material, and hardness requirements of elastomeric pads
- Know dimensional, material, and planeness requirements of pad retainers
- Know requirements governing the use of elastomeric pads
- Know the requirements for and perform perpendicularity check of concrete cylinder ends prior to test
- Know the limits for and perform check for depressions in concrete cylinder ends prior to test

Job-task analysis (JTA) for ACI Certification of Concrete Strength Testing Technician (Continued)

- Know requirements for the use of unbonded caps in combination with other capping methods
- Know wear requirements for pads and perform examination for excessive wear
- Know and perform the procedures for centering, initial loading, and checking specimens for perpendicularity
- Know and perform the procedures for loading, testing, and calculation per Test Method C39/C39M, including the proper reporting of test results
- Understand methodology used to qualify the use of unbonded caps for various strength levels and to qualify the permitted number of pad reuses
- Understand the use of calculations used in qualification testing for computing the difference in strength for each pair of cylinders and computing the average strength of cylinders tested using unbonded caps and the reference capping system
- Know the minimum percentage of reference capping system strength that must be met to qualify unbonded caps for use

ASTM C39/39M – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

- Understand scope of test method
- Understand summary of test method
- Understand significance and use of test method
- Understand calibration requirements of testing machine
- Understand design requirements of testing machine
- Understand accuracy requirements of testing machine
- Understand general requirements for bearing blocks
- Understand requirements for bottom bearing blocks
- Understand requirements for upper spherically-seated blocks
- Understand requirements for load-indicating dials
- Understand requirements for digital load indicators
- Know requirements for allowable variance in cylinder diameter
- Know requirements for and perform check of perpendicularity and planeness of cylinder ends
- Know the requirements for determining daily average diameter
- Understand the requirements for determining density of test specimens (when requested)
- Know the requirements for conducting length measurements
- Know the requirements for maintaining specimens in a moist condition until time of test
- Understand the permissible time tolerances for testing
- Know and perform the procedure for positioning and centering specimens in the machine
- Know and perform the procedures for zeroing the machine and aligning upper bearing block
- Know and perform the procedure for applying the test load at the proper rate
- Know and perform the procedures for applying the load to failure and identifying break type
- Know and perform the calculation of test results, including the proper reporting of compressive strength
- Know how to correct strength values for a given length-to-diameter ratio
- Know which information is to be included on reports

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(Continued)**

ASTM C78/78M – Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)

- Understand scope of test method
- Understand significance and use of test method
- Understand general requirements for testing machines
- Understand requirements for third-point loading apparatus
- Know requirements for dimensions, shape, and surface conditions of test specimens
- Understand technician qualification requirements
- Know requirements for testing moist-cured specimens
- Know and perform the procedure for positioning specimens on support blocks, including checking and correcting for gap widths at contact points
- Understand how to calculate loading rate
- Know and perform the procedure for applying the test load at the proper rate
- Know and perform the procedure for measuring specimens for average width and depth after specimen fracture
- Know and perform the calculation of modulus of rupture when fracture occurs in the middle third of the span length
- Know and perform the calculation of modulus of rupture when fracture occurs outside the middle third of the span length
- Know the information to be included on reports
- Know and perform the reporting of modulus of rupture with proper precision