

Job-Task Analysis (JTA) for ACI Cement Physical Tester Certification

HOW TO USE THIS JTA:

On the written examination, the Candidate must:

- **Understand** the following general concepts, which may not have specified values, procedures, or measurements; *and*
- **Know** the following specific procedures or values; performance of these items may also be assessed on the performance examination.

On the performance examination:

- **Perform**—or describe verbally, where allowed—the following tasks or steps, which are part of the specified procedure; knowledge of these items may also be assessed on the written examination.

RESOURCES:

ASTM C109/C109M—Standard Test Method for Compressive Strength of Hydraulic Cement Mortars

ASTM C151/C151M—Standard Test Method for Autoclave Expansion of Hydraulic Cement

ASTM C185—Standard Test Method for Air Content of Hydraulic Cement Mortar

ASTM C187—Standard Test Method for Amount of Water Required for Normal Consistency of Hydraulic Cement Paste

ASTM C191—Standard Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle

ASTM C204—Standard Test Methods for Fineness of Hydraulic Cement by Air-Permeability Apparatus

ASTM C305—Standard Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency

ASTM C430—Standard Test Method for Fineness of Hydraulic Cement by the 45- μ m (No. 325) Sieve

ASTM C490/C490M—Standard Practice for Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete

ASTM C1437—Standard Test Method for Flow of Hydraulic Cement Mortar

ASTM C109/C109M—Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Fabrication of 2 in. cubes)

- Understand the scope and significance of the test method
- Know the required equipment necessary to perform the test
- Know the requirements of necessary equipment
- Know temperature and humidity requirements
- Know and perform mixing procedure, including order and timing
- Know and perform batch proportions for this method (6, 9, or 12 cube batch)
- Know and perform flow test, including knowing acceptable range for this test
- Know and perform procedures for filling cube molds (hand tamping)
- Know timing requirements for filling cube molds
- Know and perform proper strike-off procedure of cube specimens
- Know and perform cleaning, curing, and demolding specimen

Job-Task Analysis (JTA) for ACI Cement Physical Tester Certification (Continued)

ASTM C109/C109M—Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Testing of 2 in. cubes)

- Understand the scope and significance of the test method
- Know the required equipment necessary to perform the test
- Know the requirements of necessary equipment
- Know permissible tolerances for test ages
- Know moisture requirements prior to testing
- Know and perform cube preparation and checking for curvature
- Know and perform breaking cube in compression machine
- Understand strength calculation
- Understand reporting requirements for strength

ASTM C151/C151M—Standard Test Method for Autoclave Expansion of Hydraulic Cement

- Understand the significance and use of the test method
- Know the required equipment necessary to perform the test
- Know the requirements of necessary equipment
- Know temperature and humidity requirements
- Know the safety precautions including usage of thermometer
- Know and perform Normal Consistency Determination prior to molding test specimen
- Know and perform molding of the test specimen
- Know all timing requirements related to heating, cycling, and cooling of specimen
- Know and perform the cooling of specimen
- Know and perform a length measurement
- Know how to calculate the change in length, as the autoclave expansion
- Know reporting requirements

ASTM C185—Standard Test Method for Air Content of Hydraulic Cement Mortar

- Understand the scope and significance of the test method
- Know the required equipment necessary to perform the test
- Know the requirements of necessary equipment
- Know temperature and humidity requirements
- Know and perform mixing procedure, including order and timing
- Know and perform batch proportions for this method
- Know and perform flow test, including knowing acceptable range for this test
- Know and perform procedures for filling of 400-mL cup
- Know timing requirements for filling 400-mL cup
- Know and perform cleaning and weighing of 400-mL cup
- Understand air content calculation
- Understand reporting requirements for air content

ASTM C187—Standard Test Method for Amount of Water Required for Normal Consistency of Hydraulic Cement Paste

- Understand the significance and use of the test method
- Know the required equipment necessary to perform the test
- Know the requirements of necessary equipment
- Know temperature and humidity requirements

Job-Task Analysis (JTA) for ACI Cement Physical Tester Certification (Continued)

- Know and perform mixing procedure, including order and timing
- Know and perform molding of the test specimen
- Know all timing requirements related to molding test specimen
- Know and perform consistency determination
- Know and perform all timing requirements related to consistency determination
- Know how to calculate the water requirement
- Know reporting requirements

ASTM C191—Standard Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle

- Understand the scope and significance of the test method
- Know the required equipment necessary to perform the test
- Know the requirements of necessary equipment
- Know temperature and humidity requirements
- Know and perform mixing procedure and molding of the test specimen per Normal Consistency (C187)
- Know all timing requirements related to molding specimen as per Normal Consistency (C187)
- Know and perform time of setting determination (one cycle)
- Know and perform all timing requirements related to time of setting
- Know how to interpolate initial time of setting
- Know how to determine final set
- Know reporting requirements

ASTM C204—Standard Test Methods for Fineness of Hydraulic Cement by Air-Permeability Apparatus

- Understand the scope and significance of the test method
- Know the required equipment necessary to perform the test
- Know the requirements of necessary equipment
- Know how to determine the bed volume and calculate cement weight
- Know and perform preparation of the cement bed
- Know and perform permeability test including the airtight connection and temperature checks
- Know how to calculate the specific surface values
- Know reporting requirements

ASTM C305—Standard Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency

- Understand the significance and use of this practice
- Know the required equipment necessary to perform mixing of cements and mortars
- Know the requirements of necessary equipment
- Know temperature and humidity requirements of room
- Know temperature requirements of the water and dry materials
- Know and perform mixing procedure for pastes, including order and timing
- Know and perform mixing procedure for mortars, including order and timing

Job-Task Analysis (JTA) for ACI Cement Physical Tester Certification (Continued)

ASTM C430—Standard Test Method for Fineness of Hydraulic Cement by the 45- μ m (No. 325) Sieve

- Understand the scope and significance of the test method
- Know the required equipment necessary to perform the test
- Know the requirements of necessary equipment
- Know how to determine the Sieve Correction Factor
- Know and perform the procedure
- Know acceptable cleaning procedure and frequency
- Know how to calculate the fineness

ASTM C490—Standard Practice for Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete

- Understand the scope and significance of this practice
- Know and understand what length change is
- Know and understand what gage length is
- Know the requirements of molds for test specimens
- Know the requirements for gage studs used for test specimens
- Know the requirements for preparation of the molds for use
- Know the requirements for the comparator and the reference bar
- Know and perform the length measurement procedure
- Know procedure for length measurements of specimens stored in moist conditions

ASTM C1437—Standard Test Method for Flow of Hydraulic Cement

- Understand the scope and significance of the test method
- Know the required equipment necessary to perform the test
- Know the requirements of necessary equipment
- Know temperature and humidity requirements
- Know and perform filling the mold (*can be performed as part of C185 or C109 demonstration)
- Know all timing requirements related to filling mold
- Know and perform removing mold, dropping table, and measuring the flow
- Know and perform flow calculation