



## National Craft Assessment and Certification Program S P E C I F I C A T I O N S

### Masonry V1 AEN28MASON01

June 2016

#### Focus Statement

A journey level mason must be able to build, maintain and repair block and brick edifices, mix and apply mortar, plaster and grout, safely use hand and power tools in accordance with regulatory and industry standards; must be able to utilize Construction Drawings to build with block and brick as well as estimate costs of materials; must understand relevant Building Codes as they pertain to masonry construction, know the principals and applications behind reinforcing materials and techniques, know the design and construction and how to build various **structural elements** and **architectural** features commonly used in Masonry construction.

#### Overview

- Two-hour closed-book examination
- May use a basic function, non-printing calculator
- No extra papers, books, notes or study materials are allowed
- The minimum passing score is 75
- A corresponding hands-on Performance Verification is available

#### NCCER Curriculum

All NCCER knowledge assessments are referenced to NCCER's curriculum modules as listed on this specification sheet. You may order modules from Pearson (800.922.0579) or from NCCER's Online Catalog at [www.nccer.org](http://www.nccer.org).

#### Assessment Development

All questions are developed and approved by subject matter experts under the direction of NCCER.

#### Credentials

Upon successful completion of the knowledge assessment, NCCER will send applicable credentials to the assessment center.

#### Score Report and Training Prescription

Each candidate will have access to their assessment results including their overall score and recommended training.

#### NCCER Registry

Knowledge assessment results are recorded in NCCER's Registry and become a part of the portable record of an individual's NCCER credentials.

#### Knowledge Assessment Contents:

Content Domain	Number of Questions
Personnel Safety (28101-13) (28106-13)	12
Equipment and Tools of the Trade (28102-13)	10
Measurements, Drawings, and Specifications (28103-13) (28201-14) (28304-14) (28306-14)	10
Masonry Materials (28104-13) (28305-14)	9
Masonry Installation (28105-13) (28202-14) (28205-14)	18
Reinforcing Masonry (28203-14) (28204-14)	9
Elevated and Specialized Masonry (28301-14)	9
<b>Total Number of Questions</b>	<b>77</b>

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S P E C I F I C A T I O N S

Learning Objectives related to Assessment:

	Personnel Safety
Registry ID Number:	Module Title and Objectives:
28101-13	<b>Describe modern masonry materials and techniques.</b>
	Explain how concrete masonry units (CMUs or block) are used in construction.
	Explain how stone is used in construction.
	Describe how mortar and grout are used in masonry construction.
	Describe how wall structures are created using masonry units.
	<b>Recognize the basic safety precautions when working with masonry materials.</b>
	List basic safety practices
	Describe personal protective equipment used in masonry.
	<b>Explain how to mix mortar and lay masonry units.</b>
	Explain how to mix mortar.
	Describe how to lay masonry units.
	<b>Describe the skills, attitudes, and abilities needed to be a successful mason.</b>
	Identify the skills of a successful mason.
	Identify the attitudes of a successful mason.
	Identify the abilities of a successful mason.
28106-13	<b>Understand the importance of safety on a job site.</b>
	Identify the costs of job accidents.
	Identify the causes of accidents.
	Recognize hazards.
	Demonstrate proper housekeeping techniques.
	Observe mortar and concrete safety.
	Observe flammable liquid safety.
	<b>Recognize the proper use of personal protective equipment in masonry.</b>
	Describe how to use protective lenses and face shields.
	Describe how to use hearing protection.
	Describe how to use gloves.
	Describe how to use respirators.
	<b>Explain how to work safely from elevated surfaces.</b>
	Explain fall protection procedures.
	Describe personal fall arrest systems.
	List basic scaffold safety guidelines.
	Explain how to protect against falling objects.
	<b>Describe how to use tools and equipment safely.</b>
	Describe how to use hand tools safely.
	Describe how to use saws safely.
	Describe how to use mixers safely.
	Describe how to use grinders safely.
	Describe how to work safely around forklifts.
	List basic electrical safety guidelines.
	Describe how to use powder-actuated tools safely.
	<b>Explain how to handle materials properly.</b>

	Describe how to store and stockpile masonry materials.
	Describe how to stack brick.
	<b>Equipment and Tools of the Trade</b>
Registry ID Number:	Module Title and Objectives:
28102-13	<b>Identify hand tools used in masonry.</b>
	Describe how to use trowels.
	Describe how to use hammers and chisels.
	Describe how to use jointers and brushes.
	Identify other hand tools used in masonry.
	<b>Identify measures and measuring tools used in masonry.</b>
	Describe how to use rules.
	Describe how to use levels.
	Describe how to use chalk boxes, squares, plumb bobs, and laser levels.
	Describe how to use corner poles, lines, and fasteners.
	<b>Identify mortar equipment used in masonry.</b>
	Describe how to use mortar boxes.
	Describe how to use mixing accessories.
	<b>Identify power tools used in masonry.</b>
	Describe how to use masonry saws.
	Describe how to use splitters.
	Describe how to use grinders.
	Describe how to use power drills and powder-actuated tools.
	<b>Identify power equipment used in masonry.</b>
	Describe how to use a mortar mixer.
	Describe how to use a masonry pump, vibrator, and hydraulic grout placer.
	Describe how to use pressurized cleaning equipment.
	<b>Identify lifting equipment used in masonry.</b>
	Describe how to use mounted and portable hoists.
	Describe how to use hydraulic-lift materials trucks.
	Describe how to use forklifts and pallet jacks.
	<b>Recognize scaffolds used in masonry.</b>
	Identify scaffold systems.
	Describe how to assemble and disassemble tubular frame scaffold.
	Measurements, Drawings, and Specifications
Registry ID Number:	Module Title and Objectives:
28103-13	<b>Cutting and Fitting Gaskets</b>
	Identify and explain gasket types.
	Identify and explain gasket materials.
	Lay out and cut gaskets.
	Install gaskets.
28201-14	<b>Identifying and Installing Valves</b>
	Identify types of valves that start and stop flow.
	Identify types of valves that regulate flow.
	Identify types of valves that relieve pressure.
	Identify types of valves that regulate the direction of flow.
	Identify types of valve actuators.

	Explain how to properly store and handle valves.
	Explain valve locations and positions.
	Explain the factors that influence valve selection.
	Interpret valve markings and nameplate information.
28304-14	<b>Identify the requirements and contents of commercial drawings.</b>
	Explain the requirements of commercial drawings.
	List the contents of commercial plans and describe the purpose of each.
	<b>Read and interpret commercial drawings.</b>
	Identify common views used in commercial drawings.
	Explain how to read and interpret architectural drawings.
	Explain how to read and interpret structural drawings.
	Explain how to read and interpret shop drawings.
	Define building information modeling and describe its applications.
	<b>Explain the purpose of written specifications.</b>
	Describe how specifications are written.
	Explain the format of specifications.
28306-14	<b>Describe the elements of site plans and topographical maps.</b>
	List characteristics of contour lines.
	<b>Describe layout control points.</b>
	Explain how to convert between distance measurement systems.
	Identify the types of control points.
	Explain how to place control points and other markers.
	Describe how to communicate information on control points and other markers.
	Discuss how control markers are color-coded.
	<b>Identify distance measurement tools and equipment.</b>
	Explain how to use tapes.
	Explain how to use range poles.
	Explain how use plumb bobs and gammon reels.
	Explain how to use hand sight levels.
	<b>Describe how to make distance measurements.</b>
	Explain how to estimate distances by pacing.
	Describe how to measure distances electronically.
	<b>Identify differential leveling tools and equipment.</b>
	Identify leveling instruments.
	Describe the use of tripods.
	Describe the use of leveling rods.
	Explain how to set up and adjust leveling instruments.
	Explain how to test the calibration of leveling instruments.
	<b>Explain the basics of differential leveling.</b>
	Define differential leveling terminology.
	Explain the differential leveling procedure.
	Explain how field notes are recorded and used.
	<b>Identify leveling applications.</b>
	Explain how to transfer elevations up a structure.
	Explain profile, cross-section, and grid-leveling.
	<b>Describe how to lay out building corners.</b>
	Explain how to construct batter boards.
	Describe how to use the 3-4-5 rule.



Masonry Materials	
Registry ID Number:	Module Title and Objectives:
28104-13	<b>Name and describe the ingredients and types of mortar.</b>
	Describe the use of portland cement, hydrated lime, and sand.
	Describe masonry cement.
	Describe preblended mortars.
	Describe the use of water and admixtures.
	Describe the types of masonry mortar.
	<b>Describe properties of plastic and hardened mortar.</b>
	Describe plastic mortar.
	Describe hardened mortar.
	<b>Identify the common problems found in mortar application and their solutions.</b>
	Describe the effects of improper proportioning and poor-quality materials.
	Explain the effects of extreme weather and tempering.
	Describe efflorescence.
	<b>Explain how to properly set up, maintain, and dispose of mortar and use the mortar mixing area.</b>
	Describe how to set up a mixing area.
	Describe how to maintain the mixing area.
	Describe how to mix mortar with a power mixer.
28305-14	<b>Explain how to estimate block, mortar, and grout.</b>
	Describe how to use the coursing method for block.
	Describe square foot method for block.
	Explain how to estimate opening and lintels.
	Explain how to estimate mortar for single-wythe walls.
	Explain how to estimate mortar for multiwythe walls.
	Explain how to estimate grout.
	<b>Explain how to estimate brick and mortar.</b>
	Explain the coursing method for brick.
	Explain the square foot method for brick.
	Describe how to allow for openings in an estimate.
	Explain how to estimate mortar for brick.
	<b>Describe how to estimate accessory items.</b>
	Explain how estimate joint reinforcement.
	Explain how to estimate structural reinforcement.
	Explain how to estimate masonry ties.
	Explain how to estimate other masonry units.
Masonry Installation	
Registry ID Number:	Module Title and Objectives:
28105-13	<b>Describe how to install concrete masonry units.</b>
	Identify the characteristics of concrete masonry units.
	Explain how to set up, lay out, and bond concrete masonry units.
	Explain how to lay and tool concrete masonry units.
	Explain how to clean concrete masonry units.
	<b>Describe how to install brick.</b>
	Identify the characteristics of brick.
	Explain how to set up, lay out, and bond brick.
	Explain how to lay and tool brick.
	Explain how to clean brick.

	<b>Describe how to cut concrete masonry units and brick.</b>
	Explain how to cut with chisels and hammers.
	Explain how to cut with masonry hammers.
	Explain how to cut with saws and splitters.
	Explain how to check units and cuts.
	<b>Describe how to install masonry reinforcement and accessories.</b>
	Describe how to install masonry reinforcements.
	Describe how to install masonry accessories.
28202-14	<b>Explain the requirements for construction of various types of residential foundations.</b>
	Explain what spread foundations are.
	Explain what raft and mat foundations are.
	Explain what foundation walls are.
	<b>Identify and explain the characteristics, uses, and installation techniques for clay brick and concrete pavers.</b>
	Describe the various types of clay brick pavers.
	Explain how to install clay brick pavers.
	Describe the various types of concrete and interlocking pavers.
	Explain how to install concrete and interlocking pavers.
	<b>Lay out and build steps, patios, and decks made from masonry units.</b>
	Describe the various types of steps.
	Explain how to recognize patterns and tread designs.
	Explain how to build a concrete base.
	Explain how to set clay brick in steps.
	Explain how patios are constructed.
	Explain how decks are constructed.
	<b>Explain how to lay out and build fireplaces and chimneys.</b>
	Explain the basic theory of the fireplace.
	Describe the parts of a fireplace.
	Explain the key points of workmanship.
	Explain how to lay out chimneys and fireplaces.
	Explain how to begin the fireplace.
	Explain how to finish the fireplace.
	Describe a multi-opening fireplace.
28205-14	<b>Identify the structural principles and fundamental uses of basic types of walls.</b>
	Identify the structural principles and fundamental uses of solid masonry walls.
	Identify the structural principles and fundamental uses of hollow masonry walls.
	Identify the structural principles and fundamental uses of cavity walls.
	Identify the structural principles and fundamental uses of composite walls.
	Identify the structural principles and fundamental uses of anchored veneer walls.
	Identify the structural principles and fundamental uses of retaining walls.
	Identify the structural principles and fundamental uses of freestanding walls.
	<b>Identify the requirement for and function of control joints and expansion joints.</b>
	Identify the effects of temperature and moisture on control joints and expansion joints.
	Identify the uses of control joints.
	Identify the uses of expansion joints.
	<b>Lay out and construct various corners and intersections.</b>
	Lay out and construct tothing.
	Lay out and construct corbeling.
	Lay out and construct intersecting walls.
	Lay out and construct angled corners.

Reinforcing Masonry	
Registry ID Number:	Module Title and Objectives:
28203-14	<b>Name and describe the primary ingredients in grout and how it is prepared.</b>
	Explain the characteristics of coarse and fine aggregates.
	Explain the characteristics of admixtures.
	Explain the role of water content in grout.
	Explain why compressive strength is important.
	Explain what mix specifications are and why they are important.
	Explain the procedures for mixing grout.
	<b>Describe how grout is placed.</b>
	Explain what low-lift grouting is and how to place grout using this technique.
	Explain what high-lift grouting is and how to place grout using this technique.
	Explain why mortaring of joints for grouted masonry is important.
	Explain how to use mechanical vibrators with grout.
	<b>Describe how to construct reinforced walls and masonry elements.</b>
	Explain how to cut and bend rebar.
	Explain how to place rebar in reinforced walls.
	Explain how to install bond beams and bond-beam lintels.
	Explain how to install precast lintels.
	Explain how to install piers, pilasters, and columns.
28204-14	<b>Describe the methods and materials used to install masonry openings.</b>
	Describe how to use and install door and window frames.
	Describe how to use and install windowsills.
	Describe how to use and install steel lintels.
	Describe how to use and install chases and recesses.
	<b>Describe the methods and materials used to tie a single masonry wythe together.</b>
	Describe how to use and install ladder and truss joint reinforcement.
	Describe how to use and install seismic reinforcements.
	<b>Describe the methods and materials used to tie two masonry wythes together.</b>
	Describe how to use and install flexible anchors.
	Describe how to use and install horizontal anchors.
	<b>Describe the methods and materials used to tie a masonry wythe and structural elements.</b>
	Describe how to use and install rigid ties and bolts.
	Describe how to use and install bearing plates.
	Describe how to use and install saddles.
	Describe how to use and install strap ties.
Elevated and Specialized Masonry	
Registry ID Number:	Module Title and Objectives:
28301-14	<b>Identify the proper personal protective equipment and safety precautions related to elevated masonry.</b>
	Describe safety precautions related to an elevated work area.
	Discuss fall protection related to elevated work areas.
	Describe how to properly brace a wall.
	Describe how to properly brace a concrete masonry wall for wind.
	Describe how to properly brace a wall for backfill.
	<b>Describe elevated masonry systems.</b>



	List the construction sequence for elevated masonry systems.
	Describe how elevated masonry systems are designed.
	Identify common exterior walls used for elevated masonry systems.
	Identify common interior walls used for elevated masonry systems.
	<b>Describe how to properly handle materials at elevations.</b>
	Explain safety precautions to be observed when working around cranes.
	Explain safety precautions to be observed when working around material hoists.
	Explain safety precautions to be observed when moving and stocking materials.
	Explain safety precautions to be observed when working at elevated workstations.
	Explain how disposal chutes and waste bins are used when working from elevated workstations.