

SECTION 04851

CUT LIMESTONE - ANCHORED

This guide specification has been prepared by TexaStone Quarries LLC to assist design professionals in the preparation of a specification section covering cut limestone, secured with flexible ties or rigid anchors.

Requirements for flashings, weeps, and clear water repellents or sealers are not included in this section due to the wide variety of products available, but can easily be added if desired and if not specified in other sections of the project manual.

This specification may be used as the basis for developing either a project specification or an office master specification. Since it has been prepared according to the principles established in the *Manual of Practice* published by The Construction Specifications Institute (CSI), it may be used in conjunction with most commercially available master specifications systems with minor editing.

The following should be noted in using this guide specification:

- Editing notes to assist users are separated from specification text by rows of asterisks. Delete these notes prior to final printing.
- Optional text requiring a selection by the user is enclosed within brackets, e.g.: "Section [01330.] [____.]"
- Items requiring user input are enclosed within brackets, e.g.: "Section [____ - ____]."
- Optional paragraphs are separated by an "OR" statement, e.g.:

*** OR ***

- Metric equivalents to inch-pound units follow the inch-pound units. Inch-pound units are contained within single character sets, i.e. <1 inch>. Inch-pound units are contained within double character sets, i.e. <<25 mm>>. Metric measurements are rationalized units based on the SI system of measurement. Delete either the inch-pound or metric units of measure depending on project requirements; do not include both units in a project specification, as conflicting requirements could result.

This and other guide specifications are available in both hard copy and a variety of electronic formats to suit most popular word processing programs and operating platforms. Please contact TexaStone Quarries LLC at 432-354-2569 or www.texastone.com for additional copies or for information on available electronic formats.

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 1. Cut limestone veneer, anchored.
 2. Mortar.
 3. Anchors and accessories.

- B. Related Sections:
 1. Division 1: Administrative, procedural, and temporary work requirements.
 2. Section [07920 - Joint Sealers:] [_____ - _____:] Joint sealer and backer rod.

1.2 REFERENCES

 Edit the following to include only those standards referenced elsewhere in this section.

- A. American Society for Testing and Materials (ASTM):
 1. A 82 - Specification for Cold-Drawn Steel Wire for Concrete Reinforcement.
 2. A 153/A 153M - Specification for Zinc-Coating (Hot Dip) on Iron and Steel Hardware.
 3. A 666 - Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 4. C 97 - Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.
 5. C 99 - Test Method for Modulus of Rupture of Dimension Stone.
 6. C 144 - Specification for Aggregate for Masonry Mortar.
 7. C 150 - Specification for Portland Cement.
 8. C 170 - Test Method for Compressive Strength of Dimension Stone.
 9. C 207 - Specification for Hydrated Lime for Masonry Purposes.
 10. C 241 - Standard Test Method for Abrasion Resistance of Stone Subject to Foot Traffic.
 11. C 270 - Specification for Mortar for Unit Masonry.
 12. C 404 - Specification for Aggregates for Masonry Grout.
 13. C 880 - Test Method for Flexural Strength of Dimension Stone.

- B. International Masonry Industry All-Weather Council (IMIAC) - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.3 SUBMITTALS

 The following provides for submission of detailed layout and installation drawings. Delete for smaller, less complex projects.

- A. Shop Drawings: Include location and sizes of pieces, arrangement and size of joints, anchorage details, and other details of installation.

- B. Product Data: Provide information on anchors including sizes, profiles, materials, and finishes.

- C. Samples:
 1. Stone: <[4 x 12] [____ x ____] inch> <<[100 x 300] [____ x ____] mm>> samples showing [each] color and finish.
 2. Mortar: <[3 x 3] [____ x ____] inch> <<[75 x 75] [____ x ____] mm>> samples showing [each] color range.
 3. Accessories: Each accessory.

- D. Test Reports:
 1. Indicating mortar and grout compliance with ASTM C 270.
 2. Indicating stone compliance with specified requirements.

1.4 QUALITY ASSURANCE

 The following provides for a site-constructed mockup for review of materials and workmanship. Delete for smaller, less complex projects.

- A. Mockup:
 1. Size: <[4] [] feet> <<[1200] [] mm>> wide x <[8] [] feet> <<[2400] [] mm>>-high.
 2. Locate [] [where directed by Architect/Engineer.]
 3. Show stone size, color, and finish; anchors; flashings; weeps; and joint profile.
 4. Approved mockup may [not] remain as part of the Work.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Stack stone minimum <4 inches> <<100 mm>> above ground. Provide nonstaining spacers between pieces and polyethylene or other suitable film as protective covering.
- B. Protect mortar materials from moisture absorption and damage; reject damaged containers.
- C. Store sand to prevent inclusion of foreign matter.
- D. Protect reinforcement and anchors from corrosion.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements:
 1. Hot weather requirements: If ambient temperature is over <95 degrees F> <<35 degrees C>> or relative humidity is less than 50 percent, protect from direct sun and wind exposure for minimum 48 hours after installation.
 2. Cold weather requirements:
 - a. Follow IMIAC guidelines.
 - b. Do not use frozen materials or build upon frozen work.
 3. Do not apply water repellent coating:
 - a. When ambient or surface temperature is below minimum temperature recommended by manufacturer.
 - b. If possibility of entrapped or frozen water exists.
 - c. When rain is expected during next 72 hours.
 - d. During high winds.

PART 2 - PRODUCTS

2.1 MATERIALS

 In the following paragraphs, select one or more stones to suit project conditions. Refer to current TexaStone literature or contact your TexaStone representative for assistance in making selections.

- A. Limestone:
 1. Source: "Permian Sea Coral" by TexaStone Quarries LLC, Garden City, Texas.
 2. Characteristics:
 - a. Water absorption: Maximum 3.50 percent, tested to ASTM C 97.

- b. Specific gravity: 2.337, tested to ASTM C 97.
- c. Density: Minimum <140 pounds per cubic foot> <<2255 kg/cu m>>, tested to ASTM C 97.
- d. Modulus of rupture: Minimum <400 PSI> <<2.76 MPa>>, tested to ASTM C 99.
- e. Compressive strength: Minimum <4000 PSI> <<27.68 MPa>>, tested to ASTM C 170.
- f. Flexural strength: Minimum <700 psi> <<4.82 MPa>>, tested to ASTM C 880.

**** OR ****

B. Limestone:

- 1. Source: "Hadrian" by TexaStone Quarries LLC, Garden City, Texas.
- 2. Characteristics:
 - a. Water absorption: Maximum 8.0 percent, tested to ASTM C 97.
 - b. Specific gravity: 2.146, tested to ASTM C 97.
 - c. Density: Minimum <110 pounds per cubic foot> <<1762 kg/cu m>>, tested to ASTM C 97.
 - d. Modulus of rupture: Minimum <400 PSI> <<2.76 MPa>>, tested to ASTM C 99.
 - e. Compressive strength: Minimum <1800 PSI> <<12.41 MPa>>, tested to ASTM C 170.
 - f. Flexural strength: Minimum <300 psi> <<2.07 MPa>>, tested to ASTM C 880.

**** OR ****

C. Limestone:

- 1. Source: "Desert Sunset" by TexaStone Quarries LLC, Garden City, Texas.
- 2. Characteristics:
 - a. Water absorption: Maximum 8.0 percent, tested to ASTM C 97.
 - b. Specific gravity: 2.059, tested to ASTM C 97.
 - c. Density: Minimum <110 pounds per cubic foot> <<1762 kg/cu m>>, tested to ASTM C 97.
 - d. Modulus of rupture: Minimum <400 PSI> <<2.76 MPa>>, tested to ASTM C 99.
 - e. Compressive strength: Minimum <1800 PSI> <<12.41 MPa>>, tested to ASTM C 170.
 - f. Flexural strength: Minimum <450 psi> <<3.10 MPa>>, tested to ASTM C 880.

**** OR ****

D. Limestone:

- 1. Source: "TexaStone Pink" by TexaStone Quarries LLC, Garden City, Texas.
- 2. Characteristics:
 - a. Water absorption: Maximum 8.0 percent, tested to ASTM C 97.
 - b. Specific gravity: 2.075, tested to ASTM C 97.
 - c. Density: Minimum <110 pounds per cubic foot> <<1762 kg/cu m>>, tested to ASTM C 97.
 - d. Modulus of rupture: Minimum <400 PSI> <<2.76 MPa>>, tested to ASTM C 99.
 - e. Compressive strength: Minimum <1800 PSI> <<12.41 MPa>>, tested to ASTM C 170.
 - f. Flexural strength: Minimum <400 psi> <<2.76 MPa>>, tested to ASTM C 880.

**** OR ****

E. Limestone:

- 1. Source: "Cedar Hill Cream" by TexaStone Quarries LLC, Garden City, Texas.
- 2. Characteristics:
 - a. Water absorption: Maximum 9.0 percent, tested to ASTM C 97.
 - b. Specific gravity: 2.067, tested to ASTM C 97.
 - c. Density: Minimum <110 pounds per cubic foot> <<1762 kg/cu m>>, tested to ASTM C 97.
 - d. Modulus of rupture: Minimum <400 PSI> <<2.76 MPa>>, tested to ASTM C 99.
 - e. Compressive strength: Minimum <1800 PSI> <<12.41 MPa>>, tested to ASTM C 170.

- f. Flexural strength: Minimum <500 psi> <<3.49 MPa>>, tested to ASTM C 880.

**** OR ****

F. Limestone:

- 1. Source: "Peach" by TexaStone Quarries LLC, Garden City, Texas.
- 2. Characteristics:
 - a. Water absorption: Maximum 8.0 percent, tested to ASTM C 97.
 - b. Specific gravity: 2.154, tested to ASTM C 97.
 - c. Density: Minimum <110 pounds per cubic foot> <<1762 kg/cu m>>, tested to ASTM C 97.
 - d. Modulus of rupture: Minimum <400 PSI> <<2.76 MPa>>, tested to ASTM C 99.
 - e. Compressive strength: Minimum <1800 PSI> <<12.41 MPa>>, tested to ASTM C 170.
 - f. Flexural strength: Minimum <500 psi> <<3.49 MPa>>, tested to ASTM C 880.

In the following paragraphs select finish for exposed faces of stone. Refer to current TexaStone literature or contact your TexaStone representative for assistance in making selections.

- 3. Finish: [Split face.] [Sawn.] [Honed.] [Sandblasted.] [Etched.] [Polished] [Tumbled] [Bush hammered.]
- 4. Free from cracks, seams, and starts that could impair its structural integrity or function. Inherent variations characteristic to quarry from which it is obtained are acceptable.
- 5. Color, texture, and finish consistent with range of samples approved by Architect/Engineer.

G. Mortar Materials:

- 1. Portland cement: ASTM C 150, Type I, white, non-staining to stone. For exposed surfaces provide cement from one source throughout project.
- 2. Lime: ASTM C 207, Type S.
- 3. Aggregate: ASTM C 144, standard masonry type, [_____] color. For exposed surfaces, provide aggregate from one source throughout project.

H. Water: Clean and potable.

2.2 ACCESSORIES

Include the following paragraph for stone attached with a two-piece flexible type anchor. Other types of ties may be included if desired.

A. Wall Ties:

- 1. Ties: <[3/16] [_____] inch> <<[5] [_____] mm>> diameter steel wire formed to triangular shape, length to extend to within 1 inch of outer stone face.
- 2. Connectors: <[12] [_____] gage > <<[2.7] [_____] mm>> steel, minimum <[3/4] [_____] inch> <<[19] [_____] mm>> wide x <[9] [_____] inches> <<[225] [_____] mm>> long [, with backing plate].
- 3. Finish: Hot dip galvanized after fabrication in accordance with ASTM A 153, Class B2.
- 4. Fasteners: Type best suited to application, corrosion resistant coated steel, minimum <5/8 inch> <<16 mm>> penetration into framing.

**** OR ****

Include the following paragraph for stone anchored with stainless steel anchors or dowels.

- B. Anchors and Dowels: Stainless steel, ASTM A 666, Type 304, of sizes and profiles best suited to application.

Ensure that joint sealers specified in other sections are nonstaining to stone.

- C. Joint Sealer: Specified in Section [07920.] [_____.]
- D. Stone Cleaner: Not harmful to stone, joint materials, or adjacent surfaces. Non-proprietary acids not permitted.

2.3 MIXES

- A. Mortar Mix: ASTM C 270, Type [N.] [_____.]
- B. Mixing:
1. Mix in accordance with ASTM C 270.
 2. Provide uniformity of color in exposed mortar.
 3. Thoroughly mix ingredients in quantities needed for immediate use.
 4. Mix dry ingredients mechanically until uniformly distributed; add water to achieve workable consistency.
 5. Discard lumpy, caked, frozen, and hardened mixes.
 6. Use mortar within 2-1/2 hours after initial mixing at ambient temperatures below <80 degrees F> <<27 degrees C>> and within 1-1/2 hours after initial mixing at ambient temperatures over <80 degrees F> <<27 degrees C>>.
 7. Do not add antifreeze compounds to lower freezing temperature of mortar or grout.

2.4 FABRICATION

- A. Form external stone corners to [square butt] [quirk mitered] [_____] joint profile.
- B. Fabricate for <[3/8] [_____] inch> <<[10] [_____] mm>> beds and joints.
- C. Cut or saw bed and joint surfaces square.
- D. [Saw] [Rough cut] backs of stone.
- E. Where indicated, slope exposed top surfaces of stone and horizontal sill surfaces for shedding water.
- F. Cut drip slot in stone projecting more than <[1-1/2] [_____] inches> <<[38] [_____] mm>>. Size slot not less than <1/4 inch> <<6 mm>> wide and <1/4 inch> <<6 mm>> deep for full width of projection.
- G. Provide holes and cutouts to accommodate anchors, dowels, and items attached to stone.
- H. Fabrication Tolerances:
1. Variation in width or height: Plus or minus <[1/16] [_____] inch> <<[1.5] [_____] mm>>.
 2. Variation in thickness, except at exposed ends: Plus or minus <[1/8] [_____] inch> <<[3] [_____] mm>>.
 3. Variation in thickness at exposed ends: Plus or minus <[1/16] [_____] inch> <<[1.5] [_____] mm>>.
 4. Variation from true plane: Plus or minus <[1/16] [_____] inch in 3 feet> <<[1.5] [_____] mm/m>>.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Establish lines, levels, and coursing. Protect from disturbance.
- B. Clean stone prior to installation. Do not use wire brushes or implements that can mark or damage exposed surfaces.
- C. Wet stone in preparation for placement to minimize moisture suction from mortar.

3.2 INSTALLATION

- A. Install stone in accordance with approved Shop Drawings.
- B. Arrange stone pattern to provide uniform color distribution and [constant <[3/8] [] inch> <<[10] [] mm>>] [varied] joint sizes throughout.
- C. Set stone plumb and level. [Align adjacent pieces in same plane.]
- D. Obtain Architect/Engineer's approval prior to cutting or fitting any item not so indicated on Shop Drawings. Do not impair appearance or strength of stone work by cutting.
- E. Set stone in full mortar setting bed to fully support stone over bearing surface. Use spacers to maintain correct joint width.
- F. Completely fill beds and joints, then rake out for pointing.
- G. Keep exposed faces free from mortar; remove mortar on exposed faces before it sets.

 Include the following paragraph for stone attached with wall ties.

- H. Secure stone with wall ties:
 - 1. Space ties to provide one tie per <[2] [] square feet> <<[0.2] [] sq m>> at maximum spacing of <[16] [24] inches> <<[400] [600] mm>> on center horizontally.
 - 2. Locate ties within <3 inches> <<300 mm>> of ends of masonry walls and openings. Place additional ties within <12 inches> <<300 mm>> of ends of walls and around openings.

**** OR ****

 Include the following paragraph for stone anchored with stainless steel anchors or dowels.

- I. Secure stone with concealed [anchors.] [dowels.] Space [anchors] [dowels] at maximum <[24] [] inches> <<[600] [] mm>> on center.
- J. Point joints with pointing mortar; tool to [concave] [] profile.
- K. Fill control joints with sealant as specified in Section [07920;] []; finish flush with face of stone.

3.3 INSTALLATION TOLERANCES

- A. Maximum variation from level and plumb: <[1/8] [] inch in 10 feet> <<[3] [] mm/m>>, noncumulative.
- B. Maximum variation in plane between adjacent pieces at joint: Plus or minus <[1/16] [] inch>

<<[1.5] [] mm>>.

3.4 CLEANING

- A. Clean <[4 x 4] [] x [] foot> <<[1200 x 1200] [] x [] mm>> sample panel in location directed by Architect/Engineer. When approved, use same materials and techniques to clean remainder of stone.
- B. Protect adjacent and underlying surfaces.
- C. Apply masonry cleaner in accordance with manufacturer's instructions. Acids are not permitted.
- D. Do not use steel or metallic brushes brushes.
- E. Thoroughly rinse surfaces with clean water after completion of cleaning; remove all traces of cleaning solution.

END OF SECTION