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May 17, 2018

Mr. Pierre Begin
Glendyne Inc.
396 rue Principale
Saint Marc du Lac Long, Quebec
G0L 1T0

**RE: Tests on North Country Unfading Black Slate to
ASTM C406/C406M-15
Report No. 18C099**

Dear Mr. Begin:

A total of 20 slate samples were received at our laboratory on May 4, 2018. These were sawn on our slate saw in 4 inch by 5 inch specimens and 2 inch by 4 inch specimens. At the conclusion, all specimens were inspected by the undersigned and a selection was made for the various tests to ASTM C406/C406M-15, Standard Specification for Roofing Slate. Following are the results of the tests.

1) ASTM C120/C120M-15 - Flexure Testing of Slate
North Country Unfading Black Slate

A total of 10 specimens were selected. These measured a nominal 4 inches by 5 inches by 0.28 inches thick. The width and thickness measurements were done to 0.001 inches. Conditioning and testing were done as per ASTM C120/C120M-15 by our dimension stone technician and assisted by a second lab technician. Following are the test results.

<u>Specimen #</u>	<u>Thickness</u>	<u>Breaking Load</u>
1B	0.267 in	845 lbs
2A	0.267 in	861 lbs
7A	0.294 in	1297 lbs
8B	0.264 in	784 lbs
10B	0.327 in	1484 lbs
12A	0.264 in	926 lbs
14B	0.272 in	609 lbs
16A	0.275 in	765 lbs
17B	0.279 in	698 lbs
18A	0.270 in	852 lbs
Avg.	0.278 in.	912 lbs

Minimum breaking load requirement for S1 slate as per
ASTM C406/C406M-15: 575 lbs.

2) ASTM C121/C121M-15 - Water Absorption of Slate
North Country Unfading Black Slate

A total of 6 specimens were selected. These measured a nominal 4 inches by 5 inches by 0.28 inches thick. Conditioning and testing were done as per ASTM C121/C121M-15 by our dimension stone technician. Following are the test results.

Specimen # Absorption

3B	0.23%
5A	0.22%
9B	0.18%
11A	0.19%
13B	0.20%
19A	0.18%
Average	0.20%

Maximum requirement as per ASTM C406/C406M-15

S1: 0.25% S2: 0.36% S3: 0.45%

**3) ASTM C217/C217M-15 Weather Resistance of Slate
North Country Unfading Black Slate**

A total of 3 specimens were selected. These measured a nominal 2 inches by 4 inches by 0.28 inches thick. They were ground smooth on both faces with a No. 80 abrasive. Thickness tests at each interval were done to 0.00005 inches using a high precision electronic thickness gauge. Conditioning was done as per the requirements of ASTM C217/C217M-15. All scraping and thickness measurements were done by our dimension stone technician assisted by another of our technicians. Following are the test results.

<u>Specimen #</u>	<u>Depth of Softening</u>
4C	0.00026 inches
6C	0.00028 inches
15C	0.00033 inches
Average	0.00029 inches

Maximum requirement as per ASTM C406/C406M-15

S1: 0.002 inches S2: 0.008 inches S3: 0.014 inches

4) DISCUSSION

As per ASTM C406/C406M-15, Standard Specification for Roofing Slate, the slate is graded as per the requirements of Table 1. A copy of ASTM C406/C406M-15 is attached.

The results indicate that all test method results meet the S1 category of slate. Thus the slate meets Grade S1 Classification as per ASTM C406/C406M-15.

Respectfully submitted

ST. LAWRENCE TESTING & INSPECTION CO. LTD.



G.G. McIntee, P. Eng.

GGM: jp

Attachments



Standard Specification for Roofing Slate¹

This standard is issued under the fixed designation C406/C406M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers the material characteristics, physical requirements, and sampling appropriate to the selection of slate for use as roof shingles.

1.2 Slates not included in this specification are those containing soft carbonaceous ribbons. The wide variation in physical properties and composition of such ribbon slates render their service life uncertain under some conditions of use.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

2. Referenced Documents

2.1 ASTM Standards:²

- C119 Terminology Relating to Dimension Stone
- C120/C120M Test Methods of Flexure Testing of Slate (Breaking Load, Modulus of Rupture, Modulus of Elasticity)
- C121/C121M Test Method for Water Absorption of Slate
- C217/C217M Test Method for Weather Resistance of Slate

3. Terminology

3.1 *Definitions*—Definitions shall be in accordance with Terminology C119.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *service life*—a period of time over which the slate material is expected to require no repair or replacement due to weathering.

3.2.2 *ribbons*—narrow bands of carbonaceous material, darker in color than the surrounding slate. These ribbons are

inclusions of the original beds and are softer and less durable than the surrounding material.

4. Classification

4.1 Roofing slate shall be classified by grade in accordance with the physical requirements of Table 1, with the classification limited to the test specimen thickness, or greater thickness, as determined under Test Methods C120/C120M.

4.2 When comparing slates of the same grade and equal thickness, but from various sources, slates which meet the required breaking load at the lowest specimen thickness will yield the best performance on the roof in terms of resistance to impact damage.

4.3 Expected service life of the various grades, depending on geographic location and environmental exposure, is as follows:

Grade	Service Life (years)
Grade S ₁	over 75
Grade S ₂	40 to 75
Grade S ₃	20 to 40

5. Ordering Information

5.1 *Color*—The commercial color specified should be preceded by the words “unfading” or “semi-weathering” or “weathering” to indicate the allowable change in the original slate color, over time, upon exposure on the roof.

5.2 *Standard Roofs*—Sloping roofs utilizing a nominal thickness of 1/4 in. [6 mm], are known as standard roofs. These shingles shall be rectangular unless otherwise specified. These shingles shall be machine punched or drilled for two nails located for the required headlap and installation methods.

5.3 *Textural Roofs*—Sloping roofs utilizing various sizes, thicknesses, textures, and colors for architectural effects, are known as textural roofs. These shingles shall be machine punched or drilled for two nails located for the required headlap and installation methods.

5.4 *Graduated Roofs*—Sloping roofs utilizing a greater range of sizes, thicknesses, and exposed lengths of shingles, are known as graduated roofs. The slates are arranged on the roof so that the thickest and longest occur at the eaves and gradually diminish in size and thickness toward the ridges. These shingles shall be machine punched or drilled for two nails located for the required headlap and installation methods.

¹ This specification is under the jurisdiction of ASTM Committee C18 on Dimension Stone and is the direct responsibility of Subcommittee C18.03 on Material Specifications.

Current edition approved April 1, 2015. Published May 2015. Originally approved in 1957 as C406-57 T. Last previous edition approved in 2010 as C406-10. DOI: 10.1520/C0406_C406M-15.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

TABLE 1 Physical Requirements

Classification	Breaking Load, min lbf(or N) ^A	Absorption, max, % ^B	Depth of Softening, max, in. (mm) ^C
Grade S ₁	575 [2560]	0.25	0.002 [0.05]
Grade S ₂	575 [2560]	0.36	0.008 [0.20]
Grade S ₃	575 [2560]	0.45	0.014 [0.36]

^A See Test Methods C120/C120M.

^B See Test Method C121/C121M.

^C See Test Method C217/C217M.

6. Physical Requirements

6.1 Slate supplied under this specification shall conform to the physical requirements listed in Table 1 and be no thinner than the thickness of the average of the test samples reported under Test Methods C120/C120M.

6.2 Slates with broken corners on the exposed ends shall not be installed when either the base or leg of the right triangular piece broken off is greater than 1½ in. [40 mm]. Slates with broken corners are acceptable for cutting stock.

6.3 The curvature of shingles shall not exceed ¼ in. in 12 in. [3 mm in 300 mm]. Curved slate shall be sheared and punched to permit it to be laid with the convex side up.

6.4 “Knots” and “knurls” are rounded geological features that affect the smoothness of split. They are acceptable on the exposed portion of the top face of a slate shingle. For standard roofs, shingles having knots or knurls projecting in excess of ¼ in. [1.5 mm] on the back or covered portions shall not be used if their location on the shingle prevents proper fit and contact.

6.5 Slate shall be free from ribbons.

6.6 Not more than 1 % of broken slates, including those having cracks materially precluding ringing when sounded, shall be accepted.

6.7 Face dimensions shall not differ from those specified by more than ¼ in. [3 mm].

6.8 Slates shall be trimmed with right angle corners, square to within ¼ in. in 12 in. [3 mm in 300 mm].

7. Sampling

7.1 Samples for testing of characteristics and physical properties, if required, shall be representative of the slate to be used.

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