

## Section 718—Traffic Signing & Marking Material

### 718.01 Retroreflective Sheeting

Furnish retroreflective sheeting material that conforms to AASHTO M 268, except that the minimum coefficients of retroreflection for brown type I sheeting shown in AASHTO M 268, table 1, are amended as follows:

- (a) 2.0 cd/lx/m<sup>2</sup> at 0.2° observation angle and – 4° entrance angle.
- (b) 1.0 cd/lx/m<sup>2</sup> at 0.2° observation angle and + 30° entrance angle, and at 0.5° observation angle and – 4° entrance angle.
- (c) 0.5 cd/lx/m<sup>2</sup> at 0.5° observation angle and + 30° entrance angle.

Furnish retroreflective sheeting material that conforms to AASHTO M 268 supplemental requirement S1, if specified. Furnish reboundable retroreflective sheeting that conforms to AASHTO M 268, including supplemental requirement S2.

Furnish sheeting that is either heat activated or pressure sensitive (class 1), engineer grade, unless otherwise specified. Ensure that colors are as specified in the MUTCD and as SHOWN ON THE DRAWINGS.

Ensure that no more than 12 months elapse from the date of manufacture to the date of application.

When an adhesive is used, use backing class 1, 2, or 3, in accordance with AASHTO M 268.

### 718.02 Test Procedures

Use test procedures in accordance with AASHTO M 268, except that subsection S1.3.3 is amended as follows:

The stock cultures of *Aspergillus niger*, American Type Culture Collection number 6275, may be kept for not more than 4 months in a refrigerator at a temperature from 3 °C to 10 °C. Use subcultures incubated at 28 °C to 30 °C for 10 to 14 days in preparing the inoculum.

### **718.03 Plywood Panels**

Fabricate the panels from HDO plywood, two sides Douglas Fir, exterior type, conforming to U.S. Product Standard 1 (current edition), with a B-grade veneer or better on both faces. Ensure that surfacing overlay material is high-density 90–90 resin-impregnated fiber, permanently fused to the base panel under heat and pressure. Furnish material that is suitable for sign manufacturing and compatible with reflective-sheeting adhesive. Do not permit any marks, blemishes, or damage of any kind. Overlay color may be either black or buff, unless specified otherwise. Ensure that each panel edge-brand includes the following: HDO B–B G1 EXT APA PS 1.

Use a minimum 13-mm-thick plywood for signs less than 600 mm in the longest dimension. Use a minimum 15-mm-thick plywood for all other signs cut from a single sheet. Use a minimum 19-mm-thick plywood for all signs requiring joining.

Abrade, clean, and degrease the face of the plywood panel in accordance with methods recommended by the manufacturer of the retroreflective sheeting. Treat the edges of the plywood panel with an approved edge sealant.

### **718.04 Steel Panels**

Fabricate the panels from 2-mm continuous-coat galvanized sheet steel blanks conforming to ASTM A 525. Mill phosphatize the zinc coating (designation G 90) to a thickness of  $1.1 \pm 0.5$  g/m<sup>2</sup> of surface area.

The finished plate shall be free of twist or buckles and the background substantially a plane surface. Clean, degrease, or otherwise prepare the panels in accordance with methods recommended by the sheeting manufacturer.

### **718.05 Aluminum Panels**

Furnish sheets and plates that conform to ASTM B 209, alloy 6061–T6 or 5052–H38.

Fabricate temporary panels and permanent panels that are 750 X 750 mm or smaller from 2-mm-thick aluminum sheets. Fabricate larger permanent panels from 3-mm-thick aluminum sheets.

Furnish blanks that are free from laminations, blisters, open seams, pits, holes, and other defects that may affect their appearance or use. Ensure that thickness is uniform and the blank commercially flat. Perform shearing, cutting, and punching before preparing the blanks for application of reflective material.

Clean, degrease, and chromate the blanks, or otherwise properly prepare the panels in accordance with methods recommended by the sheeting manufacturer.

#### **718.06 Plastic Panels**

**(a) Plastic.** Fabricate the panels from sheets of lightweight, flexible, high-impact, and ultraviolet-chemical-resistant polycarbonate material or approved equivalent that will accept adhesives, coatings, and retroreflective sheeting material, as recommended for such material.

Fabricate panels that are 600 X 600 mm or smaller from 2-mm-thick plastic blanks. Fabricate larger panels from 3-mm-thick plastic blanks.

Furnish panels that are flat and free of buckles, warps, and other defects. Where multiple panels adjoin, ensure that the gap between adjacent panels is no greater than 16 mm. Ensure that signs larger than 600 X 600 mm have reinforcement stiffeners attached on the back for rigidity and for mounting on the supports.

**(b) Fiberglass-Reinforced Plastic.** Fabricate fiberglass-reinforced plastic signs from fiberglass-reinforced thermoset polyester acrylic modified laminate sheets. Furnish sign panel that is ultraviolet stabilized for outdoor weathering ability. Ensure that sign panel accepts adhesives, coatings, and retroreflective sheeting material, as recommended.

Furnish sign panel free of visible cracks, pinholes, foreign inclusions, and surface wrinkles that would affect implied performance, alter the specific dimensions of the panel, or otherwise affect the sign panel's serviceability.

Wipe sign panel surface clean with a slightly dampened cloth before applying reflective sheeting.

Furnish fiberglass-reinforced plastic that complies with the recommendations of the Fiberglass Reinforced Panel Council publication "Recommended Traffic Control Sign Panel Specification." Unless otherwise SHOWN ON THE DRAWINGS, furnish material that is brown, matching FSS 595a, color number 20059.

#### **718.07 Extruded Aluminum Panels**

Fabricate the panels from aluminum alloy 6063-T6 conforming to the requirements of ASTM B 221. Ensure that panel thickness and fabrication conform to Subsection 718.05. The maximum allowable deviation from flat on the face is 4 mm/m.

### **718.08 Paint**

Furnish premium-grade exterior silicone alkyd enamel paint with a color to match the color of the HDO plywood substrate.

### **718.09 Silk Screen Inks**

Furnish inks that are compatible with the sheeting, as determined by the manufacturer of the ink and the manufacturer of the sheeting. Furnish color as specified in the MUTCD and as SHOWN ON THE DRAWINGS.

### **718.10 Edge Film**

Furnish edge film that is a pressure-sensitive, premium-quality, clear, ultraviolet-resistant, 75-mm-wide vinyl film.

### **718.11 Signposts**

Fabricate traffic signposts from wood, steel, plastic, aluminum, or fiberglass-reinforced plastic, as specified.

**(a) Wood Posts.** Fabricate wood posts from dry number 1 structural-grade Douglas Fir, Southern or Ponderosa Pine, Hemlock, Spruce, or Western Larch conforming to AASHTO M 168. Treat the posts with waterborne preservative ACA, ACZA, or CCA, in accordance with AWWA standard C14, but ensure that the minimum preservative retention is 6 kg/m<sup>3</sup>.

**(b) Steel Posts.** Fabricate steel posts from billet or rail steel conforming to ASTM A 499. Drill or punch 10-mm holes in the posts along the centerline of the web before galvanizing. Begin punching or drilling 25 mm from the top of the post and proceed on 25-mm centers for the entire length of the post. Galvanize the posts in accordance with ASTM A 123.

**(c) Aluminum Posts.** Fabricate aluminum posts in approved standard shapes and thicknesses using aluminum alloy 6061-T6, 6351-T5, 6063-T6, or 6005-T5 conforming to ASTM B 221.

**(d) Plastic Posts.** Fabricate flexible posts made with high-impact-resistant, ultraviolet, chemical-resistant polycarbonate material or approved equivalent.

**(e) Fiberglass-Reinforced Plastic Posts.** Fabricate fiberglass-reinforced plastic posts from fiberglass-reinforced thermoset polymers. Post to be ultraviolet stabilized for outdoor weathering ability.

### **718.12 Object Marker & Delineator Posts**

Fabricate object marker and delineator posts from wood, steel, aluminum, plastic, or fiberglass-reinforced plastic.

(a) **Wood Posts.** Furnish 100 x 100-mm wood posts that conform to Subsection 718.11.

(b) **Steel Posts.** Furnish flanged U-channel steel posts that weigh not less than 3 kg/m and conform to ASTM A 36. Galvanize the posts in accordance with ASTM A 123.

(c) **Aluminum Posts.** Furnish standard-shaped 3-mm-thick aluminum posts conforming to ASTM B 221, alloy 6061-T6.

(d) **Plastic Posts.** Furnish flexible delineator posts made with high-impact-resistant, ultraviolet-chemical-resistant polycarbonate or approved equivalent.

(e) **Fiberglass-Reinforced Plastic Posts.** Fabricate fiberglass-reinforced plastic posts from fiberglass-reinforced thermoset polymers. Post to be ultraviolet stabilized for outdoor weathering ability.

### 718.13 Hardware

Use galvanized steel or aluminum alloy for fittings such as lag screws, washers, clip angles, wood screws, shear plates, U-bolts, clamps, bolts, nuts, and other fasteners.

Furnish high-strength steel bolts, nuts, and washers conforming to specifications in Subsection 717.01. Galvanize steel hardware in accordance with ASTM A 153.

Furnish aluminum alloy bolts, nuts, and washers conforming to specifications in Subsections 717.13 and 717.14, as applicable.

Furnish oversize bolt heads and oversize neoprene or nylon washers for plastic sign panels.

### 718.14 Letters, Numerals, Arrows, Symbols, & Borders

Furnish colors as SHOWN ON THE DRAWING and in accordance with Subsection 718.01 and the FHWA's "Standard Alphabets for Highway Signs," current edition.

Perform all silk-screening operations precisely as prescribed in writing by the manufacturers of the ink and the sheeting to which they are applied.

Furnish silk screen inks that are color matched to eliminate any visual difference between silk-screened material and applied material of the same color on the same sign.

Form letters, numerals, and other units to provide a continuous stroke width with smooth edges. Make the surface flat and free of warp, blisters, wrinkles, burrs, and splinters. Ensure that units of the sign message conform to the following:

**(a) Type L-1 (Screen Process).** Apply letters, numerals, arrows, symbols, and borders on the retroreflective sheeting or opaque background of the sign by direct or reverse screen process. Apply messages and borders that are of a darker color than the background to the paint or the retroreflective sheeting by direct process. Produce messages and borders that are of a lighter color than sign background by the reverse screen process.

Use opaque or transparent colors, inks, and paints in the screen process of the type and quality recommended by the retroreflective sheeting manufacturer.

Perform the screening in a manner that results in a uniform color and tone, with sharply defined edges of legends and borders and without blemishes on the sign background that will affect intended use.

Air dry or bake the signs after screening in accordance with manufacturer's recommendations to provide a smooth, hard finish. Any signs with blisters or other blemishes will be rejected.

**(b) Type L-3 (Direct-Applied Characters).** Cut letters, numerals, symbols, borders, and other features of the sign message from the type and color of the retroreflective sheeting specified and apply them to the sign background's retroreflective sheeting in accordance with the retroreflective sheeting manufacturer's instructions. Ensure that the retroreflective sheeting has a minimum coefficient of retroreflection ( $R_A$ ) in accordance with ASTM D 4956.

### **718.15 Delineator & Object Marker Retroreflectors**

Retroreflector units for delineators and object markers are either type 1 (acrylic plastic lens) or type 2 (retroreflective sheeting). Furnish the units ready for mounting.

**(a) Type 1 (Acrylic Plastic Lens).** The retroreflector unit has an acrylic plastic lens with a minimum area of 4,500 mm<sup>2</sup>, prismatic optical elements, and a smooth, clear, transparent face. Fabricate the back from similar material and fuse it to the lens around the entire perimeter to form a homogenous unit. Retroreflection is provided by the lens prismatic optical elements. Permanently seal the units against the intrusion of dust, water, and air.

Ensure that the coefficient of (retroreflective) luminous intensity of each retroreflector unit equals or exceeds the minimum values shown in table 718-1, regardless of the orientation angle.

Mount the retroreflector unit in a housing fabricated from 1.6-mm aluminum alloy 3003-H-14 or similar material, or from cold-rolled, hot dip galvanized steel with a thickness of 1.6 mm. Provide antitheft attachment hardware.

Table 718-1.—Minimum coefficient of (retroreflective) luminous intensity ( $R_p$ ) (cd/lx).

Observation Angle (°)	Entrance Angle (°)	White <sup>a</sup>	Yellow	Red
0.1	0	10.7	6.5	2.8
0.1	20	4.2	2.3	1.1

a. Crystal, clear, or colorless are acceptable color designations.

**(b) Type 2 (Retroreflective Sheeting).** The retroreflector unit is composed of a fungus-resistant type III, type IV, or type V retroreflective sheeting material with a class 1 or class 2 adhesive backing conforming to AASHTO M 268.

Attach type 2 retroreflective units to an aluminum or plastic support panel (target plate) of the size and dimension specified. Type 1 units require a sealed optical system complete with housing and assembly hardware and do not require attachment to a support panel unless otherwise specified.

Furnish post-mounting antitheft hardware consisting of bolts, nuts, washers, fastening plates, brackets, and so forth, as required.

#### 718.16 Conventional Traffic Paint

Furnish an alkyd resin ready-mixed paint for use on asphalt and Portland cement concrete pavements conforming to FSS TT-P-115F.

#### 718.17 Waterborne Traffic Paint

Furnish an acrylic water-based ready-mixed paint for use on asphalt and Portland cement concrete pavements conforming to the following:

**(a) Composition.** Furnish a paint composed of resin solids of 100 percent acrylic polymer with the exact formulation determined by the manufacturer. Conform to the following:

- (1) Pigment, by mass, ASTM D 3723 ..... 45 to 55%
- (2) Nonvolatile vehicle, by mass, FTMS 141, method 6121 .... 40% min.
- (3) Lead, chromium, cadmium, or barium ..... 0%
- (4) Volatile organic matter ..... 250 g/L max.
- (5) Mass of paint, ASTM D 1475 ..... 1.44 kg/L min.

**(b) Viscosity.** Conform to ASTM D 562, 75 to 95 Krebs units.

**(c) Drying Time.** Conform to the following:

- (1) Paint shall dry to a no-pickup condition, according to ASTM D 711, in a maximum of 10 minutes.
- (2) Paint having 0.7 kg/L type 1 waterproofed glass beads shall dry to a no-tracking condition under traffic in a maximum of 90 seconds when applied at 0.38 mm ± 0.03 mm wet film thickness at 54 °C, or in a maximum of 10 minutes when applied at ambient temperatures.

**(d) Flexibility.** Conform to FSS TT-P-1952B. No cracking or flaking.

**(e) Dry Opacity.** Conform to FTMS 141, contrast ratio at 0.25 mm, 0.96 minimum.

**(f) Color.** Conform to the following:

- (1) White ..... FHWA standard highway white
- (2) Yellow ..... FHWA standard highway yellow

**(g) Daylight Reflectance.** Conform to the following, without glass beads:

- (1) White, FTMS 141, method 6121 ..... 84% relative to magnesium oxide standard
- (2) Yellow, FTMS 141, method 6121 ..... 55% relative to magnesium oxide standard

**(h) Bleeding Ratio.** Conform to FSS TT-P-1952B, 0.96 minimum.

**(i) Scrub Resistance.** Conform to ASTM D 2486, 300 cycles minimum.

**(j) Freeze-Thaw Stability.** Conform to FSS TT-P-1952B:

- (1) Change in consistency ..... ± 5 Krebs units max.
- (2) Decrease in scrub resistance ..... -10% max.

**(k) Storage Stability.** During a 12-month storage period, conform to the following:

- (1) No excessive setting, caking, or increase in viscosity.
- (2) Readily stirred to a consistency for use in the striping equipment.



**718.18 Epoxy Markings**

Formulate a two-component, 100-percent-solids type system for hot-spray application conforming to the following:

(a) **Pigments.** Furnish component A (percent by weight) as follows:

(1) White:

(a) Titanium dioxide (TiO<sub>2</sub>), ASTM D 476, type II  
16.5% min. at 100% purity ..... 18% min.

(b) Epoxy resin ..... 75 to 82%

(2) Yellow:

(a) Chrome yellow (PbCrO<sub>4</sub>), ASTM D 211, type III  
(20% min. at 100% purity) ..... 23% min.

(b) Epoxy resin ..... 70 to 77%

(b) **Epoxy Content.** For component A (weight per epoxy equivalent), ASTM D 1652, meet manufacturer's TV ± 50.

(c) **Amine Value.** For component B, ASTM D 2074, meet manufacturer's TV ± 50.

(d) **Toxicity.** Do not permit toxic or injurious fumes at application temperature.

(e) **Color.** Furnish 0.38-mm thickness (cured), as follows:

(1) White ..... FHWA standard  
highway white

(2) Yellow ..... FHWA standard  
highway yellow

(f) **Directional Reflectance.** Furnish directional reflectance without glass beads as follows:

(1) White, FSS 141, method 6121 ..... 84% relative to  
magnesium oxide  
standard

(2) Yellow, FSS 141, method 6121 ..... 55% relative to  
magnesium oxide  
standard

**(g) Drying Time.** Furnish 0.38-mm film thickness with beads as follows:

- (1) Laboratory at 22 °C, ASTM D 711 ..... 30 min max. to  
no-pickup  
condition
- (2) Field at 25 °C, viewed from 15 m ..... 10 min max. to  
no-tracking  
condition

**(h) Abrasion Resistance.** Ensure that wear index with a CS-17 wheel under a 1,000-g load for 1,000 cycles, ASTM C 501, is a maximum of 82.

**(i) Hardness.** Ensure that shore D hardness with 72- to 96-hour cure at 22 °C, ASTM D 2240, is 75 to 100.

**(j) Storage.** When stored for up to 12 months, individual epoxy components do not require mixing before use.

**718.19 Polyester Markings**

Formulate a two-component system conforming to the following:

- (a) Directional reflectance (without glass beads):
  - (1) White, FSS 141, method 6121 ..... 80% relative to  
magnesium oxide  
standard
  - (2) Yellow, FSS 141, method 6121 ..... 55% relative to  
magnesium oxide  
standard
- (b) Color:
  - (1) White ..... FHWA standard  
highway white
  - (2) Yellow ..... FHWA standard  
highway yellow
- (c) Viscosity, uncatalyzed polyester at - 4 °C,  
ASTM D 562 ..... 70 to 90 Krebs
- (d) Bleeding, ASTM D 969 ..... 6 min.

- (e) Drying time in field, viewed from 15 m ..... 45 min max. to no-tracking condition

### **718.20 Thermoplastic Markings**

Conform to AASHTO M 249.

### **718.21 Preformed Plastic Markings**

Furnish thermoplastic material consisting of a mixture of polymeric material, pigments, and glass beads homogeneously distributed throughout. Embed additional glass beads into the retroreflective surface. Provide a precoated adhesive system or liquid contact cement to make the marking material capable of being attached to asphalt and Portland cement pavements.

Ensure that the marking material molds itself to pavement contours by the action of traffic at normal pavement temperatures. Furnish marking material that can be used for patching worn areas of previously applied markings of similar composition under normal conditions of use.

Furnish material that conforms to ASTM D 4505, type I, V, VI, or VII, grade A, B, C, D, or E.

Ensure that the minimum thickness without adhesive is 1.5 mm. Ensure that a matrix with a raised pattern cross-sectional area has a minimum thickness of 0.5 mm between pattern configurations.

### **718.22 Glass Beads**

Furnish glass beads for dropping or spraying on pavement markings that conform to AASHTO M 247 for the type specified. Treat glass beads with an adherence coating, as recommended by manufacturer.

AASHTO M 247, table 1, Gradation of Glass Beads, is supplemented by the gradations of glass beads shown in table 718-2.

Ensure that type 3, 4, and 5 glass beads also conform to the following:

- (a) Treat beads with a reactive adherence coating, as recommended by the manufacturer.
- (b) Ensure that roundness, FLH T 520, conforms to 70 percent minimum for each sieve size.
- (c) Ensure that the refractive index, AASHTO M 247, is from 1.50 to 1.55.

Table 718-2.—Gradation of glass beads.

Sieve Size	Percent by Weight Passing Designated Sieve (ASTM D 1214)		
	Grading Designation		
	Type 3	Type 4	Type 5
2.36 mm	—	—	100
2.0 mm	—	100	95–100
1.7 mm	100	95–100	80–95
1.4 mm	95–100	80–95	10–40
1.18 mm	80–95	10–40	0–5
1.0 mm	10–40	0–5	0–2
850 $\mu\text{m}$	0–5	0–2	—
710 $\mu\text{m}$	0–2	—	—

### 718.23 Raised Pavement Markers

Furnish prismatic retroreflector-type markers consisting of a methyl methacrylate, polycarbonate, or suitably compounded ABS shell fitted with retroreflective lenses. Make the exterior surface of the shell smooth.

Use a retroreflector with a minimum coefficient of (retroreflected) luminous intensity conforming to table 718-3.

Table 718-3.—Minimum coefficient of (retroreflected) luminous intensity ( $R_1$ ) (mcd/lx).

Observation Angle ( $^\circ$ )	Entrance Angle ( $^\circ$ )	White <sup>a</sup>	Yellow	Red
0.2	0	279	167	70
0.2	20	112	67	28

a. Crystal, clear, or colorless are acceptable color designations.

Make the base of the marker flat, patterned, or textured and free from gloss or substances that may reduce its bond to the adhesive. Do not permit deviation from a flat surface to exceed 1 mm.

### 718.24 Temporary Pavement Markings

(a) **Preformed Retroreflective Tape.** Furnish 100-mm-wide tape conforming to ASTM D 4592, type I (removable).

(b) **Raised Pavement Markers.** Furnish an L-shaped polyurethane marker body with retroreflective tape on both faces of the vertical section, capable of retroreflecting light from opposite directions, and with an adhesive on the base.

Provide a minimum coefficient of retroreflection of 1,200 cd/lx/m<sup>2</sup> at 0.1° observation angle and – 4° entrance angle.

Fabricate the marker body from polyurethane with a 1.5-mm minimum thickness. Fabricate the vertical leg about 50 mm high by about 100 mm wide. Fabricate the base for the marker body about 30 mm wide.

Factory apply a 3-mm minimum thickness and 19-mm-wide pressure-sensitive adhesive to the marker base and protect it with release paper.

If approved, variations in design and dimensions will be permitted in order to meet manufacturer's standards.

### **718.25 Temporary Traffic Control Devices**

Furnish traffic control devices (barricades, cones, tubular markers, vertical panels, drums, portable barriers, warning lights, advance warning arrow panels, traffic control signals, and so forth) whose designs and configurations conform to the MUTCD.

Use suitable commercial-grade material for the fabrication of the temporary traffic control devices. Construct the devices from material that is capable of withstanding anticipated weather and traffic conditions and is suitable for the intended use. Do not use units that have been used on other projects without approval.

When interpreting the requirements in the applicable MUTCD sections, replace the word "should" with the word "shall."

### **718.26 Epoxy Resin Adhesives**

Furnish epoxy resin adhesives for bonding traffic markers to hardened Portland cement and asphalt concrete that conform to AASHTO M 237.

## Section 720—Structural Wall & Stabilized Embankment Material

### 720.01 Mechanically Stabilized Earth Wall Material

(a) **Concrete Face Panels.** Fabricate the panels in accordance with Section 552, except for the following:

- (1) Furnish Portland cement concrete that conforms to class A(AE) and has a minimum 30 MPa 28-day compressive strength.
- (2) In addition to meeting the requirements specified in Subsection 562.11 for removal of forms and falsework, fully support the units until the concrete reaches a minimum compressive strength of 7 MPa. The units may be shipped and/or installed after the concrete reaches a minimum compressive strength of 24 MPa.
- (3) Finish the front face of the concrete panel surface with a class 1 finish, in accordance with Subsection 552.18. Give the rear face a uniform surface finish. Scream the rear face of the panel to eliminate open pockets of aggregate and surface distortions in excess of 6 mm. Cast the panels on a flat area. Do not attach galvanized connecting devices or fasteners to the face panel reinforcement steel.
- (4) Clearly scribe on an unexposed face of each panel the date of manufacture, production lot number, and piece mark.
- (5) Handle, store, and ship all units in a way that eliminates any danger of chipping, discoloration, cracks, fractures, and excessive bending stresses. Support panels in storage on firm blocking to protect the panel connection devices and the exposed exterior finish.
- (6) Manufacture all units within the following tolerances:
  - (a) For panel dimensions, ensure that the position of panel connection devices is within 25 mm, and that all other dimensions are within 5 mm.
  - (b) For panel squareness, as determined by the difference between the two diagonals, do not exceed 13 mm.
  - (c) For panel surface finish, do not permit surface defects on smooth formed surfaces 1.5 m or more in length to exceed 3 mm. Do not permit surface

defects on textured-finished surfaces 1.5 m or more in length to exceed 8 mm.

Concrete face panels with any or all of the following defects will be rejected:

- Defects that indicate imperfect molding.
- Defects that indicate honeycombed or open texture concrete.
- Cracked or severely chipped panels.
- Color variation on front face of panel due to excess form oil or for other reasons.

**(b) Wire Facing.** Fabricate wire facing from MW40  $\infty$  MW15 welded wire fabric conforming to AASHTO M 55M, but ensure that the average shear value is not be less than 450 kPa. After fabrication, galvanize the wire mesh in accordance with AASHTO M 111.

**(c) Backing Mat.** Fabricate backing mat from MW10  $\infty$  MW10 (minimum) welded wire fabric conforming to AASHTO M 55M. After fabrication, galvanize the backing mat in accordance with AASHTO M 111.

**(d) Clevis Connector.** Fabricate clevis connectors from cold-drawn steel wire conforming to AASHTO M 32 and welded in accordance with AASHTO M 55M. After fabrication, galvanize clevis connectors in accordance with AASHTO M 111.

**(e) Connector Bars.** Fabricate the connector bars from cold-drawn steel wire conforming to AASHTO M 32. Galvanize the bars in accordance with AASHTO M 111.

**(f) Fasteners.** Furnish 13-mm-diameter heavy hexhead bolts, nuts, and washers conforming to AASHTO M 164M. Galvanize the fasteners in accordance with AASHTO M 232.

**(g) Hardware Cloth.** Fabricate hardware cloth with maximum 7-mm square mesh openings from woven steel wire fabric conforming to ASTM A 740. After fabrication, galvanize the cloth in accordance with AASHTO M 111.

**(h) Reinforcing Mesh.** Fabricate the reinforcing mesh from cold-drawn steel wire conforming to AASHTO M 32. Weld the mesh into the finished mesh fabric in accordance with AASHTO M 55M. After fabrication, galvanize the reinforcing mesh in accordance with AASHTO M 111. Repair any damage to the galvanized coating before installation.

(i) **Reinforcing Strips.** Fabricate reinforcing strips from HSLA structural steel conforming to AASHTO M 223M, grade 65 (450), type 3. After fabrication, galvanize in accordance with AASHTO M 111.

(j) **Tie Strip.** Fabricate tie strips from hot rolled steel conforming to ASTM A 570, grade 50. Galvanize in accordance with AASHTO M 111.

## 720.02 Gabion Material

(a) **Basket Mesh.** Twist or weld the mesh from galvanized steel wire, class 3, soft temper, conforming to ASTM A 641M class 3, or from aluminized steel wire, soft temper, conforming to ASTM A 809. Use wire with a minimum tensile strength of 415 MPa when tested in accordance with ASTM A 370. The zinc or aluminum coating shall be applied after the mesh fabrication has been welded.

Fabricate baskets from either twisted wire mesh or welded wire mesh. Make the mesh openings with a maximum dimension of less than 120 mm and an area of less than 7,000 mm<sup>2</sup>. Furnish baskets in the dimensions required with a dimension tolerance of  $\pm 5$  percent.

Where the length of the basket exceeds one and one-half times its width, equally divide the basket into cells less than or equal to the basket width using diaphragms of the same type and size mesh as the basket panels. Prefabricate each basket with the necessary panels and diaphragms secured so they rotate into place.

(1) **Gabion Baskets 0.3 m or Greater in the Vertical Dimension.** Fabricate the mesh for galvanized or aluminized coated gabions from wire with a diameter of 3.0 mm or greater in nominal size, and fabricate the mesh for epoxy or PVC-coated gabions from wire with a diameter of 2.7 mm or greater in nominal size.

(a) **Twisted Wire Mesh.** Form the mesh in a uniform hexagonal pattern with nonraveling double twists. Tie the perimeter edges of the mesh for each panel to a selvedge wire with a diameter of 3.9 mm or greater, or a selvedge wire with a diameter of 3.4 mm or greater for epoxy- or PVC-coated gabions, so that the selvedge is at least the same strength as the body of the mesh. Furnish selvedge wire from the same kind and type of material used for the wire mesh.

(b) **Welded Wire Mesh.** For mesh from wire with a diameter of 3.0 mm or greater in nominal size, weld each connection to obtain a minimum average weld shear strength of 2,600 N, with no value less than 2,000 N. For mesh for epoxy or PVC-coated gabions from wire with a diameter of 2.7 mm in nominal size, weld each connection to obtain a minimum average weld shear strength of 2,100 N, with no value less than 1,600 N.



(2) **Gabion Mattresses.** Fabricate the mesh from wire with a diameter of 2.2 mm or greater in nominal size.

(a) **Twisted Wire Mesh.** Form the mesh in a uniform hexagonal pattern with nonraveling double twists. Tie the perimeter edges of the mesh for each panel to a selvedge wire with a diameter of 2.7 mm or greater so that the selvedge is at least the same strength as the body of the mesh. Furnish selvedge wire from the same kind and type of material used for the wire mesh.

(b) **Welded Wire Mesh.** Weld each connection to obtain a minimum average weld shear strength of 1,300 N, with no value less than 1,000 N.

(3) **PVC-Coated Gabions.** Use either the fusion bonding or extrusion coating process to coat the galvanized or aluminized mesh.

Make the coating at least 0.38 mm in thickness. For PVC coating, make the color black or gray and conform to the following:

- (a) Specific gravity, ASTM D 792 ..... 1.20 to 1.40
- (b) Tensile strength, ASTM D 638 ..... 15.7 MPa min.
- (c) Modulus of elasticity, ASTM D 638 ..... 13.7 MPa min. at  
100% strain
- (d) Hardness—shore “A,” ASTM D 2240 ..... 75 min.
- (e) Brittleness temperature, ASTM D 746 .....  $-9^{\circ}\text{C}$  max.
- (f) Abrasion resistance, ASTM D 1242,  
method B, at 200 cycles,  
CSI-A abrader tape, 80 grit ..... 12% max. weight loss
- (g) Salt spray (ASTM B 117) and ..... No visual effect  
ultraviolet light exposure (1)  $\Delta < 6\%$   
(ASTM D 1499 and G 23 using (2)  $\Delta < 25\%$   
apparatus type E and  $63^{\circ}\text{C}$  (3)  $\Delta < 25\%$   
for 3,000 h) (6)  $\Delta < 10\%$
- (h) Mandrel bend,  $360^{\circ}$  bend at  $-18^{\circ}\text{C}$  around a  
mandrel 10 times the wire diameter ..... No breaks or  
cracks in coating

(b) **Fasteners.** For lacing wire, use wire with a diameter of 2.2 mm in nominal size and that is of the same type, strength, and coating as the basket mesh.

For welded wire mesh panels, form the spiral binders with wire that has at least the same thickness, strength, and coating as the basket mesh.

Furnish alternate fasteners that are acceptable to the gabion manufacturer and that remain closed when subjected to a 2,600-N tensile force when confining the maximum number of wires to be confined. Submit installation procedures and fastener test results.

**(c) Internal Connecting Wire.** Use lacing wire as described in Subsection 720.02(b) to reinforce side panels. Alternate stiffeners that are acceptable to the gabion manufacturer may also be used.

**720.03 Metal Bin Type Crib Walls**

Fabricate members of the type and kind of material SHOWN ON THE DRAWINGS. Conform to the following:

- (a) Galvanized steel sheets ..... AASHTO M 218
- (b) Aluminum sheets ..... AASHTO M 197M
- (c) Fiber-bonded steel sheets ..... 707.09
- (d) Aluminum-coated steel sheets ..... AASHTO M 274
- (e) Bolts and nuts ..... ASTM A 307, grade A

Furnish heavy hexagon heads and nuts without washers, or hexagon heads and nuts with two plate washers. Fabricate washers from 3.3-mm-thick round steel plate, including coating with holes not more than 1.6 mm larger than the bolt diameter. Galvanize the bolts, nuts, and washers in accordance with AASHTO M 232.

## Section 722—Anchor Material

### 722.01 Ground Anchors

Furnish material for ground anchors in accordance with the specifications shown below.

**(a) Tendons.** Furnish ground anchor tendons for either single or multiple elements that conform to one of the following:

- (1) Steel strand uncoated seven-wire stress relieved for prestressed concrete ..... AASHTO M 203M
- (2) Uncoated high-strength steel bar for prestressed concrete ..... AASHTO M 275M
- (3) Steel strand uncoated seven-wire compacted stress relieved<sup>1</sup> for prestressing concrete ..... ASTM A 779M

<sup>1</sup> Ensure that elements also conform to the minimum requirements of AASHTO M 203M.

**(b) Couplers.** Furnish couplers for tendon sections that are capable of developing 95 percent of the minimum specified ultimate tensile strength of the tendon.

**(c) Sheathing.** Furnish sheathing of the tendon in accordance with one of the following:

**(1) Unbonded Length.** For unbonded length, meet the following requirements:

*(a) Polyethylene Tube.* Furnish polyethylene of type II, III, or IV, as defined by ASTM D 1248. Furnish tubing with a minimum wall thickness of 1.5 mm.

*(b) Hot-Melt Extruded Polypropylene Tube.* Furnish polypropylene with cell classification PP 210 B5554211, as defined by ASTM D 4101. Furnish tubing with a minimum wall thickness of 1.5 mm.

*(c) Hot-Melt Extruded Polyethylene Tube.* Furnish polyethylene of high-density type III, as defined by ASTM D 3350 and D 1248. Furnish tubing with a minimum wall thickness of 1.5 mm.

*(d) Steel Tubing.* Furnish tubing that conforms to ASTM A 500 and has a minimum wall thickness of 5 mm.

(e) *Steel Pipe.* Furnish pipe that conforms to ASTM A 53, schedule 40, minimum.

(f) *Plastic Pipe.* Furnish pipe that conforms to ASTM D 1785, schedule 40, minimum.

**(2) Bonded Length.** For bonded length, meet the following requirements:

(a) *High-Density Corrugated Polyethylene Tubing.* Furnish tubing that conforms to AASHTO M 252 and has a minimum wall thickness of 0.75 mm.

(b) *Corrugated PVC Tubes.* Furnish PVC compounds that conform to ASTM D 1784, class 13464–B.

(c) *Fusion-Bonded Epoxy.* Furnish epoxy that conforms to AASHTO M 284M and has a minimum film thickness of 0.4 mm.

**(d) Grease.** Furnish grease that is compounded to provide corrosion-inhibiting and lubricating properties, and that conforms to the PTI “Post Tensioning Manual,” table 3.2.1.

**(e) Grout.** Furnish grout that consists of a pumpable mixture of Portland cement, sand, water, and admixtures mixed in accordance with Subsection 701.03. Use type I, II, or III Portland cement in accordance with Subsection 701.01.

Chemical additives that can control bleed or retard set may be used, provided that the additives conform to Subsection 711.03 and are mixed in accordance with the manufacturer’s recommendations.

Furnish grout that is capable of reaching a cube strength (AASHTO T 106) of 25 MPa in 7 days. Make grout cubes for testing from random batches of grout, as directed. Normally, strength testing will not be required, because system performance will be measured by proof-testing each anchor. Grout cube testing will be required if admixtures are used or irregularities occur in anchor testing.

**(f) Centralizers.** Centralizers and spacers may be fabricated from any type of material except wood that is not deleterious to the prestressing steel.

**(g) Anchorage Devices.** Furnish anchorage devices that conform to the PTI’s “Post Tensioning Manual,” section 3.2.3. Furnish anchorage devices for strand tendons that are designed to permit lift-off testing without the jack engaging the strand. Furnish bearing plate for anchorage devices that is steel plate conforming to AASHTO M 183M or M 222M.

Ensure that a pipe or trumpet extends from the anchor plate far enough to encapsulate the protective sheath. Furnish anchorage devices that are capable of developing 95 percent of the minimum specified ultimate tensile strength of the anchor tendon.

## Section 723—Dust Palliative Materials

### 723.01 Magnesium or Calcium Chloride Brine

Furnish chloride brines consisting of water and magnesium and/or calcium chloride with the following chemical composition (percent by weight brine):

- (a) Chloride concentration (sum of magnesium and calcium chloride):<sup>1</sup>
  - (1) Magnesium chloride products ..... 28% min.  
    Calcium chloride products ..... 36% min.
  - (2) Sulfate ..... 4.3% max.
  - (3) Nitrate ..... 5.0% max.

<sup>1</sup> Use test method R1-412/C1 (available on request from USDA Forest Service, Regional Materials Engineering Center, P.O. Box 7669, Missoula, Montana 59807).

Ensure that the pH is between 4.5 and 10.0, and that the temperature of the material is 5 °C or above when applied. Provide certification and sampling in accordance with Subsection 723.04.

### 723.02 Calcium Chloride Flake

Furnish calcium chloride flake in accordance with the following:

- (a) Chemical composition (percent by weight):
  - (1) Calcium chloride (CaCl<sub>2</sub>)<sup>1</sup> ..... 77% min.
  - (2) Total alkali chlorides (as NaCl) ASTM E 449 ..... 3% max.
  - (3) Calcium hydroxide (Ca(OH)<sub>2</sub>) ASTM E 449 ..... 0.3% max.

<sup>1</sup> Use test method R1-412/C1 (available on request from USDA Forest Service, Regional Materials Engineering Center, P.O. Box 7669, Missoula, Montana 59807).

- (b) Particle size (percent passing screen) by AASHTO T 27:
  - (1) 9.5-mm screen ..... 100%
  - (2) 4.75-mm screen ..... 80 to 100%

- (3) 600- $\mu$ m screen ..... 0 to 5%
- (c) Certification and sampling ..... 723.04

### 723.03 Lignin Sulfonate

Furnish lignin sulfonate from the residue produced by the acid-sulfite pulping of wood. Ensure that its base cation is ammonium, calcium, or sodium, and supply it as a uniform mixture that is miscible with an equal weight of water and meets the following requirements:

- (a) Undiluted lignin sulfonate:
- (1) pH, AASHTO T 200 ..... 4.5 min.
- (2) Viscosity at 25 °C, AASHTO T 202 ..... 20.5 poise max.
- (3) Total lignin solids concentration<sup>1</sup> ..... 48% min.
- (b) Solids:
- (1) Lignin sulfonate ..... 50% min.
- (2) Reducing sugars ..... 25% max.
- (c) Temperature during application ..... 5 °C to 60 °C
- (d) Certification and sampling ..... 723.04

<sup>1</sup> Use test method R1-412/LS for total lignin solids concentration (available on request from USDA Forest Service, Regional Materials Engineering Center, P.O. Box 7669, Missoula, Montana 59807).

### 723.04 Certification & Sampling

**(a) Certification With Shipments.** When each load of dust palliative is delivered, furnish the CO with one copy of the Bill of Lading and a fully executed Certificate of Compliance containing the applicable information shown in figure 723-1. A separate Certificate of Compliance will not be required if the standard Bill of Lading contains the applicable information required on the certificate.

**(b) Sampling.** Sampling of dust palliative prior to any mixing with water may be required to validate certifications furnished by the Contractor. When sampling is directed by the Government, obtain the actual samples, and give the CO the opportunity to witness sampling. Construct all liquid delivery equipment to permit sampling in conformance with AASHTO T 40 sampling procedure.

CERTIFICATE OF COMPLIANCE

Consignee \_\_\_\_\_

Transportation ID (Truck No., etc.) \_\_\_\_\_

Product Concentration by Weight \_\_\_\_\_

Net Weight Total Shipment \_\_\_\_\_

Net Liters at 15 °C \_\_\_\_\_

Product Specific Gravity at 15 °C \_\_\_\_\_

This shipment of \_\_\_\_\_ identified above and covered by this Certificate of Compliance complies with Forest Service Specifications applicable to Contract # \_\_\_\_\_ .

MSDS Identification Code: \_\_\_\_\_

Producer: \_\_\_\_\_

Destination \_\_\_\_\_

Date \_\_\_\_\_

Magnesium Chloride: \_\_\_\_\_ %

Calcium Chloride: \_\_\_\_\_ %

Lignin Sulfonate: \_\_\_\_\_ %

Signed By: \_\_\_\_\_

(Producer's Representative)

Figure 723-1.—Sample Certificate of Compliance.



## Section 725—Miscellaneous Material

### 725.01 Water

Do not use water from streams, lakes, ponds, or similar sources without prior approval. Use water that conforms to the specifications shown below.

**(a) Water for Mixing or Curing Cement Concrete, Mortar, or Grout.** Furnish water that conforms to AASHTO M 157. Potable water of known quality may be used without testing in accordance with AASHTO T 26. Potable water is defined as water that is safe for human consumption, as described by the public health authority with jurisdiction.

**(b) Water for Planting or Care of Vegetation.** Furnish water that is free of substances injurious to plant life, such as oils, acids, alkalies, and salts.

**(c) Water for Earthwork, Pavement Courses, Dust Control, & Incidental Construction.** Furnish water that is free of substances detrimental to the work.

### 725.02 Calcium Chloride & Sodium Chloride

**(a) Calcium Chloride for Concrete.** Furnish material that conforms to ASTM D 98, type L, for the concentration specified.

**(b) Sodium Chloride.** Furnish material that conforms to ASTM D 632, type II, grade 1.

### 725.03 Hydrated Lime

**(a) Lime for Masonry.** Furnish hydrated lime that conforms to ASTM C 207, type N.

**(b) Lime for Soil Stabilization & Paving.** Furnish hydrated lime or quicklime that conforms to AASHTO M 216.

### 725.04 Fly Ash

Furnish fly ash and raw or calcined pozzolans that conform to AASHTO M 295.

### 725.05 Mineral Filler

Furnish mineral filler that conforms to AASHTO M 17.

**725.06 Precast Concrete Curbing**

Furnish units conforming to the lengths, shapes, and details SHOWN ON THE DRAWINGS, and to the following:

- (a) Concrete ..... 602
- (b) Reinforcing steel ..... 709.01

**725.07 Clay or Shale Brick**

Furnish clay or shale brick that conforms to one of the following:

- (a) Sewer brick ..... ASTM C 32,  
grade SM
- (b) Building brick ..... ASTM C 62,  
grade SW

**725.08 Concrete Brick**

Furnish concrete brick that conforms to ASTM C 55, grade N-I.

**725.09 Concrete Masonry Blocks**

Furnish rectangular or segmented concrete masonry blocks. When required, form the block ends to provide an interlock at vertical joints. Furnish blocks that conform to the following:

- (a) Solid load-bearing blocks ..... ASTM C 90
- (b) Hollow load-bearing blocks ..... ASTM C 90
- (c) Nonload-bearing blocks ..... ASTM C 129

**725.10 Cellular Concrete Blocks**

Furnish cellular concrete blocks that conform to ASTM C 90, normal weight; but use concrete that conforms to Section 602.

**725.11 Precast Concrete Units**

Cast the units in substantial permanent steel forms. Provide additional reinforcement as necessary to provide for handling the units. Use concrete that conforms to the following:

- (a) 28-day strength, AASHTO T 22 ..... 25 MPa min.
- (b) Air content by volume, AASHTO T 152 ..... 5% min.

Cure the units in accordance with AASHTO M 170M.

Cast a sufficient number of concrete cylinders from each unit to permit compression tests at 7, 14, and 28 days. Make at least three cylinders for each test. If the strength requirement is met at 7 or 14 days, the units will be certified for use 14 days from date of casting.

Do not use precast concrete units when:

- Representative cylinders do not meet the strength requirement by 28 days.
- Air content tests do not meet 5 percent minimum.
- Cracks or honeycombed or patched areas are larger than 0.02 m<sup>2</sup>.

Furnish precast reinforced concrete manhole risers and tops conforming to AASHTO M 199M.

#### **725.12 Frames, Grates, Covers, & Ladder Rungs**

Fabricate metal grates and covers to evenly bear on the frames. Correct bearing inaccuracies by machining. Assemble all units before shipment. Mark all pieces to facilitate reassembly at the installation site. Uniformly coat all castings with asphalt varnish or a commercial preservative in accordance with the manufacture's standard practice. Conform to the following:

- (a) Gray iron castings ..... AASHTO M 105
- (b) Carbon steel castings ..... AASHTO M 103M
- (c) Structural steel ..... AASHTO M 183M
- (d) Galvanizing ..... AASHTO M 111
- (e) Malleable iron castings ..... ASTM A 47M
- (f) Aluminum alloy ladder rung material ..... ASTM B 221M,  
alloy 6061-T6

- (g) Aluminum castings ..... ASTM B 26M,  
alloy 356.0-T6
- (h) Asphalt varnish ..... FSS TT-V-51

**725.13 Corrugated Metal Units**

Furnish material that conforms to one of the following:

- (a) Steel corrugated units ..... AASHTO M 36M
- (b) Aluminum corrugated units ..... AASHTO M 196M
- (c) Bituminous-coated corrugated units ..... AASHTO M 190,  
type A
- (d) Polymer-precoated corrugated units ..... AASHTO M 245M,  
grade 250/250
- (e) Fiber-bonded units ..... 707.09

**725.14 Protective Coatings for Concrete**

Furnish protective coatings for bridge decks, curbs, sidewalks, and concrete portions of bridge railings. Provide one of the following coatings:

- (a) **Boiled Linseed Oil.** Furnish boiled linseed oil in accordance with ASTM D 260, type I or II.
- (b) **Petroleum Spirits (Mineral Spirits).** Furnish petroleum spirits (mineral spirits) in accordance with ASTM D 235.

**725.15 PVC Pipe for Water Distribution Systems**

Furnish material that conforms to the following for the designated sizes and strength schedules:

- (a) PVC pipe ..... ASTM D 1785
- (b) Solvent cement for pipe and fittings ..... ASTM D 2564

**725.16 Polyethylene Pipe for Water Distribution Systems**

Furnish material that conforms to ASTM D 2447 for the designated sizes and strength schedules.

**725.17 Cast Iron Soil Pipe & Fittings**

Furnish material that conforms to ASTM A 74, class SV, for the designated sizes.

**725.18 Seamless Copper Water Tube & Fittings**

Furnish material that conforms to ASTM B 88M, type L, for the designated sizes.

**725.19 Plastic Lining**

Furnish a film with a thickness of  $175 \pm 25 \mu\text{m}$  that conforms to one of the following:

- (a) PVC plastic film ..... ASTM D 1593, type II
- (b) Polyethylene plastic film ..... ASTM D 2103, type 02000

**725.20 Bentonite**

Furnish bentonite as sodium montmorillonite (sodium bentonite) in the form of a powder that meets the following requirements:

- (a) Ensure that colloid content by AASHTO T88 or ASTM D422 is 60 percent minimum.
- (b) Ensure that a sieve analysis in accordance with AASHTO T27 on a dry, unwashed, unpulverized sample yields the following:
  - (1) A minimum of 95 percent passing the 4.75-mm sieve.
  - (2) A minimum of 15 percent passing the 75- $\mu\text{m}$  sieve.

**725.21 Epoxy Resin Adhesives**

Ensure that epoxy resin adhesives conform to AASHTO M 235.

**725.22 Spray Finish**

Furnish a commercial product that is specifically designed for color spraying concrete, and that consists of a pliolite resin base, fiberglass, perlite, mica additives, and durable tinting pigments capable of making a light gray color similar to the color of concrete containing 230 g of carbon black per bag of cement.

**725.23 Color Coating**

Furnish a semiopaque colored toner containing methyl methacrylateethyl acrylate copolymer resins or equivalent resins, solvents, and color toning pigments suspended in solution by a chemical suspension agent. Ensure that the color toning pigments consist of laminar silicates, titanium dioxide, and inorganic oxides. Furnish material that conforms to the following:

- (a) Mass per liter, ASTM D 1475 ..... 1 kg min.
- (b) Solids by weight, ASTM D 2369 ..... 30% min.
- (c) Solids by volume ..... 21% min.
- (d) Drying time, ASTM D 1640 ..... 30 min at 21 °C  
and 50% max. humidity
- (e) Color change, ASTM D 822, 1,000 h ..... No appreciable change
- (f) Resistance to acids, alkalies, gasoline, ..... Excellent  
and mineral spirits, ASTM D 543
- (g) Water vapor transmission from interior ..... Transmittable  
concrete, ASTM D 1653
- (h) Exterior moisture absorption into the ..... Reduces rate  
concrete surface pores, FSS TT-C-555
- (i) Oxidation over time ..... None

**725.24 Explosives & Blasting Accessories**

For the transportation, handling, and storage of explosives, conform to 29 CFR, part 1926, subpart U.

Explosives and initiating devices include, but are not necessarily limited to, dynamite and other high explosives, slurries, water gels, emulsions, blasting agents, initiating explosives, detonators, and detonating cord.

**725.25 Mineral Slurry (Driller’s Mud)**

Furnish commercially available sodium bentonite or attapulgite in a potable water. Use a mineral grain size that will remain in suspension with sufficient viscosity and gel characteristics so the mixture is capable of transporting excavated material to a suitable screening system.

**725.26 Form Liner**

Furnish a high-quality product that attaches easily to the forming system. Install the form liner so it does not compress more than 6 mm at a concrete pour rate of 3,650 kg/m<sup>2</sup>.

**725.27 Aluminum-Impregnated Caulking Compound**

Conform to FSS TT-C-598, grade 1.