SECTION 098436 - SOUND-ABSORBING CEILING UNITS

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
   * + 1. RELATED DOCUMENTS
          1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
       2. SUMMARY
          1. Section includes shop-fabricated, acoustical panel units tested for acoustical performance, including the following:

Sound-absorbing ceiling panels.

Sound-absorbing baffle panels.

Sound-diffusing ceiling panels.

Sound-reflecting ceiling panels.

* + - * 1. Related Requirements:

Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

Section 095443 "Stretched-Fabric Ceiling Systems" for site-upholstered systems for ceilings[**and for coordinated requirements for fabric**].

Section 095446 "Fabric-Wrapped Ceiling Panels" for decorative, fabric-wrapped ceiling panels that are not required to be tested for acoustical performance[**and for coordinated requirements for fabric**].

Section 097200 "Wall Coverings" for adhesively applied textile wall coverings[**and for coordinated requirements for fabric**].

* + - 1. DEFINITIONS

Retain terms that remain after this Section has been edited for a project.

* + - * 1. NRC: Noise Reduction Coefficient.
        2. SAA: Sound Absorption Average.
      1. PREINSTALLATION MEETINGS

Retain "Preinstallation Conference" paragraph below if Work of this Section is extensive or complex enough to justify a conference.

* + - * 1. Preinstallation Conference: Conduct conference at Project site.

If needed, insert list of conference participants.

* + - 1. SUBMITTALS
         1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
         2. Manufacturer’s installation instructions shall be provided along with product data.
         3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
         4. Product Data: For each type of product.

Generally, retain option in subparagraph below for fabric facing furnished by manufacturer.

Include[**fabric facing,**] panel edge, core material, and mounting indicated.

* + - * 1. Sustainable Design Submittals:
        2. Shop Drawings: For unit assembly and installation.

Include reflected ceiling plans, elevations, sections, and mounting devices and details.

Include details at joints and corners; and details at ceiling intersections and intersections with walls. Indicate panel edge profile and core materials.

Include direction of fabric weave and pattern matching.

Retain "Samples for Initial Selection" and "Samples for Verification" paragraphs below for two-stage Samples.

* + - * 1. Samples for Initial Selection: For each type of fabric facing.

Include Samples of hardware and accessories involving color or finish selection.

* + - * 1. Samples for Verification: For the following products:

Delete "Fabric" subparagraph below if fabric is State furnished or preselected and specified; revise to suit Project.

Fabric: Full-width by approximately 36-inch- long Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.

Panel Edge: 12-inch- long Sample(s) showing each edge profile, corner, and finish.

Core Material: 12-inch- square Sample at corner.

Mounting Devices: Full-size Samples.

Assembled Panels: Approximately 36 by 36 inches, including joints and mounting methods.

Retain "Coordination Drawings" paragraph below for situations where limited space necessitates maximum utilization for efficient installation of different components or if coordination is required for installation of products and materials by separate installers. Coordinate paragraph with other Sections specifying products listed below. Preparation of coordination drawings requires the participation of each trade involved in installations within the limited space.

* + - * 1. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

Electrical outlets.

Suspended ceiling components above ceiling units.

Structural members to which suspension devices will be attached.

Items penetrating or covered by units including the following:

Lighting fixtures.

Air outlets and inlets.

Speakers.

Alarms.

Sprinklers.

Access panels.

Show operation of hinged and sliding components covered by or adjacent to units.

Retain "Product Certificates" paragraph below to require submittal of product certificates from manufacturers.

* + - * 1. Product Certificates: For each type of unit.
        2. Sample Warranty: For manufacturer's special warranty.
      1. CLOSEOUT SUBMITTALS
         1. Maintenance Data: For each type of unit to include in maintenance manuals. Include fabric manufacturer's written cleaning and stain-removal instructions.
      2. MAINTENANCE MATERIAL SUBMITTALS
         1. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

Fabric: For each fabric, color, and pattern installed, furnish length equal to 10 percent of amount installed, but no fewer than 10 sq. yd., full width of bolt.

Mounting Devices: Full-size units equal to 5 percent of amount installed, but no fewer than five devices.

* + - 1. QUALITY ASSURANCE
         1. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials, fabrication, and installation.

Indicate portion of ceiling represented by mockup on Drawings or draw mockup as separate element.

Build mockup of typical ceiling area [**as shown on Drawings**] [**96 inches wide by full width of ceiling**].[**Include intersection of wall and ceiling, corners, and perimeters.**]

Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Director’s Representative specifically approves such deviations in writing.

Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

* + - 1. DELIVERY, STORAGE, AND HANDLING
         1. Comply with fabric and unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
         2. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.
      2. FIELD CONDITIONS
         1. Environmental Limitations: Do not install units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

Retain "Lighting" paragraph below if unit appearance or installation is affected by lighting conditions. This may occur when aligning units over an extensive surface. Revise to suit Project.

* + - * 1. Lighting: Do not install units until [**a permanent level of lighting**] [**a lighting level of not less than 50 fc**] is provided on surfaces to receive the units.

Retain "Air-Quality Limitations" paragraph below to suit Project. See the Evaluations in Section 098433 "Sound-Absorbing Wall Units."

* + - * 1. Air-Quality Limitations: Protect units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.

Retain "Field Measurements" paragraph below if units are tightly fit to entire ceiling areas.

* + - * 1. Field Measurements: Verify unit locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.
      1. WARRANTY
         1. Special Warranty: Manufacturer agrees to repair or replace units and components that fail in materials or workmanship within specified warranty period.

Failures include, but are not limited to, the following:

Acoustical performance.

Fabric sagging, distorting, or releasing from panel edge.

Warping of core.

Verify available warranties and warranty periods for units and components.

Warranty Period: Two years from date of Substantial Completion.

1. PRODUCTS
   * + 1. MANUFACTURERS

Retain option in "Source Limitations" paragraph below if applicable.

* + - * 1. Source Limitations: Obtain ceiling units specified in this Section[**and wall units specified in Section 098433 "Sound-Absorbing Wall Units"**] from single source from single manufacturer.
      1. PERFORMANCE REQUIREMENTS

Revise "Fire-Test-Response Characteristics" paragraph below as required by governing code for unit location, occupancy classification, and whether sprinklered or not. Verify and insert requirements of authorities having jurisdiction; verify whether testing products as whole finish-assemblies complete with fabric is required for the Project. Below is based on the NYSBC; see the Evaluations.

* + - * 1. Fire-Test-Response Characteristics: Units shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

Surface-Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

Value in "Flame-Spread Index" subparagraph below is required for textile and expanded vinyl wall and ceiling coverings. Option in "Smoke-Developed Index" subparagraph below is the maximum allowed.

Flame-Spread Index: 25 or less.

Smoke-Developed Index: 450 or less.

Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 286.

* + - 1. SOUND-ABSORBING CEILING UNITS

Copy paragraphs below and re-edit for each product. They are intended as guides if Project requires panels of varying sizes or characteristics.

Insert drawing designation. Use these designations on Drawings to identify each product.

Panel construction, details, mounting, and acoustical performance vary with manufacturer and type of panel; coordinate acoustical performance with Project's acoustical designer. These are not lay-in-panels for suspended, acoustical ceiling systems.

* + - * 1. Sound-Absorbing Ceiling Panel <**Insert drawing designation**>: Manufacturer's standard panel construction consisting of facing material [**laminated to front face, edges, and back edge border of core**] [**stretched over front face of edge-framed core and bonded or attached to edges and back of frame**].

[Manufacturers:](http://www.specagent.com/Lookup?ulid=11786) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Armstrong World Industries, Inc](http://www.specagent.com/Lookup?uid=123457054447).

[Conwed Designscape; an Owens Corning company](http://www.specagent.com/Lookup?uid=123457054437).

Kinetics Noise Control, Inc.

Approved equivalent.

Retain one or more of 12 subparagraphs below to suit Project; available characteristics, options, and features vary with manufacturer and product.

Panel Shape: [**Flat**] [**As indicated on Drawings**].

Retain options in "Mounting" subparagraph below to suit Project, depending on weight of panel, substrate, installation appearance and tolerances, ease of replacement, and security considerations. Insert requirements for specific mounting systems or sway bracing if required, or indicate on Drawings. These mountings are not suspended, acoustical ceiling systems. See the Evaluations.

Mounting: Back mounted with manufacturer's standard [**metal clips**] [**suspension system**] [**suspension system with stiffening, back-support angles**], secured to substrate.

If retaining specific core materials in "Core" subparagraph below, consult unit manufacturers for recommendations on material composition, weight, and acoustical properties.

Core: [**Manufacturer's standard**] [**Glass-fiber board**] [**Glass-fiber blanket**] [**Mineral-fiber board**] [**Cementitious-fiber board**].

First option in "Edge Construction" subparagraph below is most common and is used with glass- and mineral-fiber board cores. Last three options are sometimes used for panels with facing material stretched over front face of edge-framed core. Framed options may be less desirable for suspended panels in seismic areas.

Edge Construction: Manufacturer's standard [**chemically hardened core with no frame**] [**extruded-aluminum or zinc-coated, rolled-steel frame**] [**extruded PVC frame**] [**wood frame, rabbeted, and splined with glued joints and machined corners**].

Revise "Edge Profile" subparagraph below if long and short edges are required to have different profiles.

Edge Profile: [**Chamfered (beveled)**] [**Eased (small radius)**] [**Mitered (beveled to a point)**] [**Radiused (bullnosed)**] [**Square**] [**Custom profile as indicated on Drawings**].

Corner Detail in Elevation: [**Square**] [**Round, radius as indicated on Drawings**] [**Custom as indicated on Drawings**] with continuous edge profile indicated.

Reveals between Panels: [**Recessed**] [**Flush**] [**Projecting**] reveals [**as selected by Director’s Representative from manufacturer's full range**] [**as indicated on Drawings**].

Generally, indicate facing material on Drawings or insert, in "Facing Material" subparagraph below, drawing designation of facing material specified in "Materials" Article.

Facing Material: [**State-furnished material**] [**As indicated on Drawings**].

Coordinate options retained in "Acoustical Performance" subparagraph below with core material and density. Options assume that facing material does not affect typical acoustical performance of core. Verify with manufacturer that NRC or SAA range retained is possible and practical for products. Manufacturers generally report NRC values only. Replace range with a single minimum value if required; a single value may be inadequate for Project's acoustical design. See the Evaluations in Section 098433 "Sound-Absorbing Wall Units" for discussion of acoustical properties. Revise mounting type to suit Project if required; see the Evaluations in this Section.

Acoustical Performance: Sound absorption [**NRC**] [**or**] [**SAA**] of [**0.50 to 0.90**] [**0.60 to 0.70**] [**0.65 to 0.75**] [**not less than 0.65**] according to ASTM C423 for [**Type A**] [**Type J**] <**Insert type**> mounting according to ASTM E795.

Nominal [**Core**] [**Overall Panel**] Thickness: [**3/4 inch**] [**1 inch**] [**1-1/2 inches**] [**2 inches**] [**As indicated on Drawings**].

If retaining dimensions in "Panel Width" and "Panel Height" subparagraphs below, clarify direction of dimensions on Drawings.

Panel Width: [**24 inches**] [**30 inches**] [**48 inches**] [**As indicated on Drawings**].

Panel Height: [**72 inches**] [**96 inches**] [**108 inches**] [**120 inches**] [**As indicated on Drawings**].

* + - * 1. Sound-Absorbing Baffle Panel <**Insert drawing designation**>: Manufacturer's standard panel construction consisting of facing material [**laminated to front and back faces and edges of core**] [**stretched over front and back faces and edge-framed core and bonded or attached to edges**].

[Manufacturers:](http://www.specagent.com/Lookup?ulid=11787) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Armstrong World Industries, Inc](http://www.specagent.com/Lookup?uid=123457054470).

[Conwed Designscape; an Owens Corning company](http://www.specagent.com/Lookup?uid=123457054457).

Kinetics Noise Control, Inc.

Approved equivalent.

Retain one or more of 11 subparagraphs below to suit Project; available characteristics, options, and features vary with manufacturer and product.

Panel Shape: [**Flat**] [**As indicated on Drawings**].

Retain one or more options in "Mounting" subparagraph below to suit Project, depending on weight of panel, substrate, installation appearance and tolerances, ease of replacement, and security considerations. If retaining more than one, indicate locations of each on Drawings or by inserts. Insert requirements for specific mounting systems or sway bracing if required, or indicate on Drawings. See the Evaluations.

Mounting: Top-edge mounted with manufacturer's standard [**metal clips**] [**suspension system**] [**suspension system with stiffening top-support angle**], secured to substrate.

If retaining specific core materials in "Core" subparagraph below, consult unit manufacturers for recommendations on material composition, weight, and acoustical properties.

Core: [**Manufacturer's standard**] [**Glass-fiber board**] [**Mineral-fiber board**] [**Cementitious-fiber board**].

First option in "Edge Construction" subparagraph below is most common and is used with glass- and mineral-fiber board cores. Last three options are sometimes used for panels with facing material stretched over front face of edge-framed core. Framed options may be less desirable for suspended panels in seismic areas.

Edge Construction: Manufacturer's standard [**chemically hardened core with no frame**] [**extruded-aluminum or zinc-coated, rolled-steel frame**] [**extruded PVC frame**] [**wood frame, rabbeted, and splined with glued joints and machined corners**].

Revise "Edge Profile" subparagraph below if bottom (horizontal) and vertical edges are required to have different profiles.

Edge Profile: [**Chamfered (beveled)**] [**Eased (small radius)**] [**Mitered (beveled to a point)**] [**Radiused (bullnosed)**] [**Square**] [**Custom profile as indicated on Drawings**].

Corner Detail in Elevation: [**Square**] [**Round, radius as indicated on Drawings**] [**Custom as indicated on Drawings**] with continuous edge profile indicated.

Generally, indicate facing material on Drawings or insert, in "Facing Material" subparagraph below, drawing designation of facing material specified in "Materials" Article.

Facing Material: [**State-furnished material**] [**As indicated on Drawings**].

Coordinate options retained in "Acoustical Performance" subparagraph below with core material and density. Options assume that facing material does not affect typical acoustical performance of core. Verify with manufacturer that NRC or SAA range retained is possible and practical for products. Manufacturers generally report NRC values only. Replace range with a single minimum value if required; a single value may be inadequate for Project's acoustical design. See the Evaluations in Section 098433 "Sound-Absorbing Wall Units" for discussion of acoustical properties. Revise mounting type to suit Project if required; see the Evaluations in this Section.

Acoustical Performance: Sound absorption [**NRC**] [**or**] [**SAA**] of [**0.50 to 0.90**] [**0.60 to 0.70**] [**0.65 to 0.75**] [**not less than 0.65**] according to ASTM C423 for [**Type A**] [**Type J**] mounting according to ASTM E795.

Nominal [**Core**] [**Overall Panel**] Thickness: [**3/4 inch**] [**1 inch**] [**1-1/2 inches**] [**2 inches**] [**As indicated on Drawings**].

Panel Width: [**24 inches**] [**30 inches**] [**48 inches**] [**As indicated on Drawings**].

Panel Height: [**72 inches**] [**96 inches**] [**108 inches**] [**120 inches**] [**As indicated on Drawings**].

* + - 1. SOUND-DIFFUSING CEILING UNITS

Copy paragraph below and re-edit for each product. It is intended as a guide if Project requires panels of varying sizes or characteristics.

Insert drawing designation. Use these designations on Drawings to identify each product.

Panel construction, details, mounting, and acoustical performance vary with manufacturer and type of panel; coordinate acoustical performance with Project's acoustical designer. These are not lay-in-panels for suspended, acoustical ceiling systems.

Generally, retain option in paragraph below unless panel is made of formed plastic without facing material. See the Evaluations in Section 098433 "Sound-Absorbing Wall Units" for discussion of these units.

* + - * 1. Sound-Diffusing Ceiling Panel <**Insert drawing designation**>: Manufacturer's standard panel construction [**consisting of facing material laminated to front face, edges, and back edge border of core**].

[Manufacturers:](http://www.specagent.com/Lookup?ulid=11788) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Armstrong World Industries, Inc](http://www.specagent.com/Lookup?uid=123457054486).

[Conwed Designscape; an Owens Corning company](http://www.specagent.com/Lookup?uid=123457054478).

Kinetics Noise Control, Inc.

Approved equivalent.

Shapes in "Panel Shape" subparagraph below diffuse sound striking the surface. Sound-diffusing panels are generally faceted but may be flat and set at angles to each other.

Panel Shape: [**Barrel**] [**Pyramidal**] [**Radially curved flat panel**] [**As indicated on Drawings**].

Retain one or more options in "Mounting" subparagraph below to suit Project, depending on weight of panel, substrate, installation appearance and tolerances, ease of replacement, and security considerations. If retaining more than one, indicate locations of each on Drawings or by inserts. Insert requirements for specific mounting systems or sway bracing if required, or indicate on Drawings. These mountings are not suspended, acoustical ceiling systems. See the Evaluations.

Mounting: Back mounted with manufacturer's standard [**metal clips**] [**suspension system**] [**suspension system with stiffening, back-support angles**], secured to substrate.

If retaining specific materials in "Core" subparagraph below, consult unit manufacturers for recommendations on material composition, weight, and acoustical properties. "Fire-retardant formed plastic" option is common for barrel- and pyramidal-shape sound-diffusing panels.

Core: [**Manufacturer's standard**] [**Glass-fiber board with a reflective component**] [**Mineral-fiber board with a reflective component**] [**Cementitious-fiber board with a reflective component**] [**Fire-retardant formed plastic**] [**Medium-density fiberboard**] [**Particleboard**], prepared for required acoustical performance.

First option in "Edge Construction" subparagraph below is most common and is used with glass- and mineral-fiber board cores. Last three options are sometimes used for panels with facing material stretched over front face of edge-framed core. Framed options may be less desirable for suspended panels in seismic areas.

Edge Construction: Manufacturer's standard [**chemically hardened core with no frame**] [**extruded-aluminum or zinc-coated, rolled-steel frame**] [**extruded PVC frame**] [**wood frame, rabbeted, and splined with glued joints and machined corners**].

Insert subparagraphs here if custom edge profile and corner detail in elevation other than square is required. Manufacturers generally do not offer options for these features on sound-diffusing panels.

Reveals between Panels: [**Recessed**] [**Flush**] [**Projecting**] reveals [**as selected by Director’s Representative from manufacturer's full range**] [**as indicated on Drawings**].

Generally, indicate facing material on Drawings or insert, in "Facing Material" subparagraph below, drawing designation of facing material specified in "Materials" Article. Revise subparagraph if an acoustically reflective coating is required on fabric.

Facing Material: [**State-furnished material**] [**As indicated on Drawings**].

Coordinate options retained in "Acoustical Performance" subparagraph below with core material and density. Options assume that facing material does not affect typical acoustical performance of core. Verify with manufacturer that NRC or SAA range retained is possible and practical for products. Manufacturers generally report NRC values only. Replace range with a single maximum value if required; a single value may be inadequate for Project's acoustical design. See the Evaluations in Section 098433 "Sound-Absorbing Wall Units" for discussion of acoustical properties. Revise mounting type to suit Project if required; see the Evaluations in this Section.

Acoustical Performance: Sound absorption [**NRC**] [**or**] [**SAA**] of [**0.05 to 0.10**] [**0.15 to 0.25**] [**0.30 to 0.40**] [**not more than 0.35**] <**Insert range or single value**> according to ASTM C423 for [**Type A**] [**Type J**] mounting according to ASTM E795.

If retaining dimensions in "Panel Width" and "Panel Height" subparagraphs below, clarify direction of dimensions on Drawings.

Panel Width: [**24 inches**] [**30 inches**] [**48 inches**] [**As indicated on Drawings**].

Panel Height: [**72 inches**] [**96 inches**] [**108 inches**] [**120 inches**] [**As indicated on Drawings**].

* + - 1. SOUND-REFLECTING CEILING UNITS

Copy paragraph below and re-edit for each product. It is intended as a guide if Project requires panels of varying sizes or characteristics.

Insert drawing designation. Use these designations on Drawings to identify each product.

Panel construction, details, mounting, and acoustical performance vary with manufacturer and type of panel; coordinate acoustical performance with Project's acoustical designer. These are not lay-in-panels for suspended, acoustical ceiling systems.

Generally, retain option in paragraph below unless panel is made of formed plastic without facing material. See the Evaluations in Section 098433 "Sound-Absorbing Wall Units" for discussion of these units.

* + - * 1. Sound-Reflecting Ceiling Panel <**Insert drawing designation**>: Manufacturer's standard panel construction [**consisting of facing material laminated to front face, edges, and back edge border of core**].

[Manufacturers:](http://www.specagent.com/Lookup?ulid=11789) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Armstrong World Industries, Inc](http://www.specagent.com/Lookup?uid=123457054489).

[Conwed Designscape; an Owens Corning company](http://www.specagent.com/Lookup?uid=123457054492).

Kinetics Noise Control, Inc.

Approved equivalent.

Shapes in "Panel Shape" subparagraph below reflect sound striking the surface.

Panel Shape: [**Flat**] [**Radially curved flat panel**] [**As indicated on Drawings**].

Retain one or more options in "Mounting" subparagraph below to suit Project, depending on weight of panel, substrate, installation appearance and tolerances, ease of replacement, and security considerations. If retaining more than one, indicate locations of each on Drawings or by inserts. Insert requirements for specific mounting systems or sway bracing if required, or indicate on Drawings. These mountings are not suspended, acoustical ceiling systems. See the Evaluations.

Mounting: Back mounted with manufacturer's standard [**metal clips**] [**suspension system**] [**suspension system with stiffening, back-support angles**], secured to substrate.

If retaining specific materials in "Core" subparagraph below, consult unit manufacturers for recommendations on material composition, weight, and acoustical properties.

Core: [**Manufacturer's standard**] [**Glass-fiber board with a reflective component**] [**Mineral-fiber board with a reflective component**] [**Cementitious-fiber board with a reflective component**] [**Fire-retardant formed plastic**] [**Medium-density fiberboard**] [**Particleboard**], prepared for required acoustical performance.

First option in "Edge Construction" subparagraph below is most common and is used with glass- and mineral-fiber board cores. Last three options are sometimes used for panels with facing material stretched over front face of edge-framed core. Framed options may be less desirable for suspended panels in seismic areas.

Edge Construction: Manufacturer's standard [**chemically hardened core with no frame**] [**extruded-aluminum or zinc-coated, rolled-steel frame**] [**extruded PVC frame**] [**wood frame, rabbeted, and splined with glued joints and machined corners**].

Insert subparagraphs here if custom edge profile and corner detail in elevation other than square is required. Manufacturers generally do not offer options for these features on sound-reflecting panels.

Reveals between Panels: [**Recessed**] [**Flush**] [**Projecting**] reveals [**as selected by Director’s Representative from manufacturer's full range**] [**as indicated on Drawings**].

Generally, indicate facing material on Drawings or insert, in "Facing Material" subparagraph below, drawing designation of facing material specified in "Materials" Article. Revise subparagraph if an acoustically reflective coating is required on fabric.

Facing Material: [**State-furnished material**] [**As indicated on Drawings**].

Coordinate options retained in "Acoustical Performance" subparagraph below with core material and density. Options assume that facing material does not affect typical acoustical performance of core. Verify with manufacturer that NRC or SAA range retained is possible and practical for products. Manufacturers generally report NRC values only. Replace range with a single maximum value if required; a single value may be inadequate for Project's acoustical design. See the Evaluations in Section 098433 "Sound-Absorbing Wall Units" for discussion of acoustical properties. Revise mounting type to suit Project if required; see the Evaluations in this Section.

Acoustical Performance: Sound absorption [**NRC**] [**or**] [**SAA**] of [**0.05 to 0.10**] [**0.15 to 0.25**] [**0.30 to 0.40**] [**not more than 0.35**] according to ASTM C423 for [**Type A**] [**Type J**] mounting according to ASTM E795.

If retaining dimensions in "Panel Width" and "Panel Height" subparagraphs below, clarify direction of dimensions on Drawings.

Panel Width: [**24 inches**] [**30 inches**] [**48 inches**] [**As indicated on Drawings**].

Panel Height: [**72 inches**] [**96 inches**] [**108 inches**] [**120 inches**] [**As indicated on Drawings**].

* + - 1. MATERIALS
         1. Sustainable Design Requirements:

Core materials vary with manufacturer and required acoustical performance. If retaining "Manufacturer's standard" option in "Core Materials" paragraph below, usually delete eight subparagraphs below specifying core materials. Coordinate with "Sound-Absorbing Ceiling Units," "Sound-Diffusing Ceiling Units," and "Sound-Reflecting Ceiling Units" articles.

* + - * 1. Core Materials:[**Manufacturer's standard.**]

Glass-Fiber Board: ASTM C612; of type standard with manufacturer; nominal density of 6 to 7 lb/cu. ft., unfaced, and dimensionally stable, molded rigid board; and with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

Glass-Fiber Blanket: ASTM C612, ASTM C553, or ASTM C665; of type standard with manufacturer; nominal density of 3 to 4 lb/cu. ft.; flexible; and with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

Mineral-Fiber Board: Maximum flame-spread and smoke-developed indexes of 25 and 10, respectively; minimum density of 13 lb/cu. ft., and with perforated surface.

Cementitious-Fiber Board: Density of not less than 20 lb/cu. ft..

Materials in "Fire-Retardant Formed Plastic," "Medium-Density Fiberboard," and "Particleboard" subparagraphs below are often used for sound-diffusing or -reflecting panels but not for sound-absorbing panels. Sound-diffusing or -reflecting cores vary with manufacturer and required acoustical performance; they can be made of sound-absorbing ceiling-panel core materials with a reflective component or of an entirely different material. Consult manufacturers for material, material weight, and acoustical properties.

Fire-Retardant Formed Plastic: Manufacturer's standard formed plastic with flame-spread index of 25 or less and smoke-developed index of 25 or less according to ASTM E84 or UL 723.

Medium-Density Fiberboard: Panels complying with ANSI A208.2, grade to suit performance requirements.

Fire-retardant panels made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less when tested according to ASTM E84 or UL 723.

Particleboard: Panels complying with ANSI A208.1, grade to suit performance requirements.

Fire-retardant panels made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less when tested according to ASTM E84 or UL 723.

Retain "Wood and Plywood" subparagraph below for wood or plywood frame and edges; revise to suit Project. Requirements for fire-retardant treatment are based on NYSBC.

Wood and Plywood: Manufacturer's standard plywood or clear, vertical grain, straight, kiln-dried hardwood.

Fire-retardant treated by pressure process with a flame-spread index of 25 or less when tested according to ASTM E84 or UL 723, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

Treated material shall have a moisture content of 28 percent or less when tested according to ASTM D3201/D3201M at 92 percent relative humidity.

Kiln-dry material after treatment to 19 percent or less for lumber and 15 percent or less for plywood.

Copy first paragraph below and re-edit for each product.

Insert drawing designation. Use these designations on Drawings to identify each facing material.

State-furnished facing materials must be acceptable to unit manufacturer; see the Evaluations in Section 098433 "Sound-Absorbing Wall Units." For highest acoustical absorption, a lining fabric or core-overlay batting is also generally not recommended by manufacturers.

* + - * 1. Facing Material <**Insert drawing designation**>: Fabric from same dye lot; color and pattern [**as indicated by manufacturer's designations**] [**matching Director’s Representative's samples**] [**as selected by Director’s Representative from manufacturer's full range**] [**as indicated on Drawings**].

Revise or delete subparagraphs below to coordinate with option retained in last paragraph above.

Manufacturer: <**Insert manufacturer's name**>.

Product Line/Pattern: <**Insert product name or designation**>.

Pattern Repeat: <**Insert requirement**>.

Style Number: <**Insert number**>.

Color: <**Insert name or number, or both**>.

Fiber Content: 100 percent [**woven polyester**] [**nonwoven polyester**] [**polyolefin**] [**acoustically transparent vinyl**].

Width: [**54 inches**] [**66 inches**].

Source: <**Insert fabric-vendor's name**>.

Retain treatments in "Applied Treatments" subparagraph below to suit Project. Treatment may affect appearance and acoustical performance and may not be offered or recommended by panel manufacturer.

Applied Treatments: [**Stain resistance**] [**and**] [**flame retardant**].

Retain "Light Reflectance" subparagraph below if ceiling light reflection is important for Project. Manufacturers generally do not report light reflectance for fabrics or units. See the Evaluations.

Light Reflectance: Average value not less than 0.75 when tested according to ASTM E1477.

Insert additional requirements in "Mounting Devices" paragraph below if manufacturer's standard devices may be unacceptable.

* + - * 1. Mounting Devices: Concealed on back or top edge of unit, recommended by manufacturer to support weight of unit.
      1. FABRICATION
         1. Standard Construction: Use manufacturer's standard construction unless otherwise indicated, with facing material applied to face, edges, and back border of dimensionally stable core and with rigid edges to reinforce panel perimeter against warpage and damage.

Retain first paragraph below for large areas covered by ceiling units.

* + - * 1. Measure each area and establish layout of panels and joints of [**uniform size with balanced borders at opposite edges**] [**sizes indicated on Drawings**] within a given area.
        2. Edge Hardening: For [**glass-fiber board**] [**and**] [**mineral-fiber board**] cores, chemically harden core edges and areas of core where mounting devices are attached.
        3. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.

Retain "Square Corners," "Radius and Other Nonsquare Corners," and "Fabrics with Directional or Repeating Patterns or Directional Weave" subparagraphs below to suit Project; insert requirements for custom corners if required. Indicate location of each corner condition on Drawings or by inserts in "Sound-Absorbing Ceiling Units," "Sound-Diffusing Ceiling Units," and "Sound-Reflecting Ceiling Units" articles.

Square Corners: Tailor corners.[**Heat-seal vinyl fabric seams at corners.**]

Radius and Other Nonsquare Corners: Attach facing material so there are no seams or gathering of material.

Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches adjacent units.

Dimension in "Dimensional Tolerances of Finished Units" paragraph below is CISCA and industry consensus; however, some manufacturers fabricate to plus or minus 1/32 inch.

* + - * 1. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:

Thickness.

Edge straightness.

Overall length and width.

Squareness from corner to corner.

Chords, radii, and diameters.

1. EXECUTION
   * + 1. EXAMINATION
          1. Examine fabric, fabricated units, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting unit performance.
          2. Proceed with installation only after unsatisfactory conditions have been corrected.
       2. INSTALLATION

Revise first paragraph below to suit Project if installation is not squarely aligned to walls and other units.

* + - * 1. Install units in locations indicated. Unless otherwise indicated, install units with edges in alignment with walls and other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
        2. Comply with manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.
        3. Align fabric pattern and grain [**with adjacent units**] [**as indicated on Drawings**].
      1. INSTALLATION TOLERANCES

Revise this article to suit Project and tolerances recommended by unit manufacturers. Values given below are examples only and are based on tolerances of finished units. Consult unit manufacturers for recommendations.

* + - * 1. Variation from Alignment with Surfaces: Plus or minus 1/16 inch in 48 inches, noncumulative.
        2. Variation from Level or Slope: Plus or minus 1/8 inch.
        3. Variation of Joint Width: Not more than 1/16 inch wide from [**hairline**] [**reveal line**] in 48 inches, noncumulative.
      1. CLEANING
         1. Clip loose threads; remove pills and extraneous materials.
         2. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 098436