

SECTION 09 77 23

SOUND-ABSORPTIVE PANELS

PART 1 - GENERAL

1.1 CONDITIONS AND REQUIREMENTS

- A. The General Conditions, Supplementary Conditions, and Division 01 – General Requirements apply.

1.2 SECTION INCLUDES

Specifier Note: Retain either of the following paragraphs after editing PART 2 - PRODUCTS. Delete options in first paragraph below that are not included in this section.

- A. [Wedge™] [MegaWedge™] [MaxWedge™] [EconoWedge™] [EconoMegaWedge™] [EconoMaxWedge™] Diffuser [fabric] [vinyl] wrapped wall panels.

Specifier Note: Delete options in paragraph below that are not included in this section.

- B. [Wedge™] [MegaWedge™] shaped [diffuser] [reflector] type [fabric-wrapped] [painted] [ceiling] [wall] panels.

1.3 RELATED SECTIONS

- A. Section 09 29 00 - Gypsum Board: Wall substrate construction.
- B. Section 09 51 13 - Acoustical Panel Ceilings: Ceiling grid to accept diffusers.

1.4 SUBMITTALS

Specifier Note: In this article, specify various types of data to be furnished by the contractor before, during, or after construction. Topics included in this article are: product data, shop drawings, samples, design data, test reports, certificates, manufacturers' instructions, manufacturers' field reports, qualification statements, and closeout submittals.

- A. Submit under provisions of Section [01 33 00] [_____].
- B. Product Data: Submit for each type of [fabric finish,] [vinyl finish,] panel edge, core material, and anchoring device indicated.
- C. LEED Submittals:
 - 1. Product Data for MR Credit 4.1 [and Credit 4.2]: Submit documentation indicating percentages of post-consumer and pre-consumer recycled content for products having recycled content including a statement of cost for each product having recycled content.
 - 2. Product Data for EQ Credit 4.1: Submit documentation for installation adhesives including a printed statement of VOC content and chemical components.
- D. Shop Drawings: Submit for [wall] [ceiling] panels. Indicate mounting devices and details; details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge and core materials. Include elevations showing panel sizes and direction of fabric weave.
- E. Samples: For each type of [fabric] [vinyl] facing from [wall] [ceiling] panel manufacturer's full range.

1. [Fabric] [Vinyl] Facing: Submit full-width by approximately 12 inches 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.
 2. Panel Edge: 12-inch long sample(s) showing each edge profile, corner, and finish.
 3. Core Material: 12-inch square sample at corner.
 4. Mounting Devices: Full-size samples.
 5. Assembled Panels: Approximately 12 by 12 inches, including joints and anchoring devices.
- F. Maintenance Data: Indicate [fabric] [vinyl] manufacturer's written cleaning and stain removal recommendations.
- G. Warranty: Submit sample indicating items covered and length of warranty.

1.5 QUALITY ASSURANCE

Specifier Note: In this article, describe qualifications, regulatory requirements, certifications, field samples, mock-ups, and pre-installation meetings.

- A. Manufacturer Qualifications: Company specializing in manufacturing fabric-wrapped panels with 10 years minimum experience.
- B. Source Limitations: Obtain panels through one (1) source from a single manufacturer.
- C. Fire-Test Response Characteristics: Provide mineral wool panel cores with the following fire-test response characteristics as determined by testing per ASTM E136:
 1. Flame-Spread Rating: 0.
 2. Smoke-Developed Index: 0.
- D. Mockups: Construct mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials, fabrication, and installation.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver panels in manufacturer's original, unopened and labeled packages.
- B. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
- C. Protect from damage due to weather, excessive temperature, and construction operations.

1.7 WARRANTY

- A. Manufacturer's standard form in which manufacturer warrants against any defects in workmanship or breakdown of the core material for two (2) years from date of delivery.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: The design for fabric-wrapped panels is based on products manufactured by Perdue Acoustics, 4210 Hester Drive, Amarillo, TX 79124; telephone: 800.729.9402, fax 806.374.9450; email: info@perdueacoustics.com; Web Site: www.perdueacoustics.com.
- B. Substitutions are not permitted.

2.2 SOUND-ABSORPTIVE PANELS

Specifier Note: Select one of the options from the following paragraphs and delete the others.

A. Wedge™ Diffisorber Fabric Finish Panels: Mineral wool core with fiberglass mat front and back; square edges; two (2) ft width of absorber slopes from 1-3/16-inch thick on one (1) side to 3-3/16-inch on other side.

1. Core Properties: Flame spread of zero (0), smoke developed rating of zero (0); minimum tensile strength of 2631 lbs/sq ft breaking load, and compressive resistance of 480 lbs/sq ft at 10 percent compression, and horizontal sag of not more than 1/2-inch in four (4) ft.
2. Fabric Facing: Selected from manufacturer's standard fabric. Bond fabric to face and edges and return at edges a minimum of two (2) inches on back of panels. Provide panels with flat, wrinkle-free surface and tailored corners.
 - a. Rating: Rating of fabric used determines rating of panel as a unit.
 - b. Recycled Content: Provide fabric with post-consumer recycled content.
3. Acoustical Properties: NRC numbers in accordance with ASTM C423 for Type A mounting. Certifiable acoustical data must be provided by an NVLAP-approved, independent testing laboratory.

a. Sound Absorption Coefficients (Fabric Finish – 2' Spaced Arrangement):

125 Hz	.50	1000 Hz	1.86
250 Hz	1.10	2000 Hz	1.63
500 Hz	1.72	4000 Hz	1.48
		NRC	1.60

b. Sound Absorption Coefficients (Fabric Finish – Abutted):

125 Hz	.50	1000 Hz	1.35
250 Hz	1.01	2000 Hz	1.23
500 Hz	1.29	4000 Hz	1.23
		NRC	1.20

B. Wedge™ Diffisorber Vinyl Finish Panels: Mineral wool core with fiberglass mat front and back; square edges; two (2) ft width of absorber slopes from 1-3/16-inch thick on one (1) side to 3-3/16-inch on other side.

1. Core Properties: Flame spread of zero (0), smoke developed rating of zero (0); minimum tensile strength of 2631 lbs/sq ft breaking load, and compressive resistance of 480 lbs/sq ft at 10 percent compression, and horizontal sag of not more than 1/2-inch in four (4) ft.
2. Vinyl Facing: Selected from manufacturer's standard micro-perforated vinyl. Bond vinyl to face and edges and return at edges a minimum of two (2) inches on back of panels. Provide panels with flat, wrinkle-free surface and tailored corners.
 - a. Rating: Rating of vinyl used determines rating of panel as a unit.
3. Acoustical Properties: NRC numbers in accordance with ASTM C423 for Type A mounting. Certifiable acoustical data must be provided by an NVLAP-approved, independent testing laboratory.

a. Sound Absorption Coefficients (Vinyl Finish – 2' Spaced Arrangement):

125 Hz	.54	1000 Hz	1.47
250 Hz	1.06	2000 Hz	1.32
500 Hz	1.27	4000 Hz	.99
		NRC	1.30

b. Sound Absorption Coefficients (Vinyl Finish – Abutted):

125 Hz	.54	1000 Hz	1.07
250 Hz	.97	2000 Hz	1.00
500 Hz	.96	4000 Hz	.76
		NRC	1.00

C. MegaWedge™ Diffsorber Fabric Finish Panels: Mineral wool core with fiberglass mat front and back; square edges; two (2) ft width of absorber slopes from 3-3/16-inch thick on one (1) side to 5-3/16-inch on other side.

1. Core Properties: Flame spread of zero (0), smoke developed rating of zero (0); minimum tensile strength of 2631 lbs/sq ft breaking load, and compressive resistance of 480 lbs/sq ft at 10 percent compression, and horizontal sag of not more than 1/2-inch in four (4) ft.
2. Fabric Facing: Selected from manufacturer’s standard fabric. Bond fabric to face and edges and return at edges a minimum of two (2) inches on back of panels. Provide panels with flat, wrinkle-free surface and tailored corners.
 - a. Rating: Rating of fabric used determines rating of panel as a unit.
 - b. Recycled Content: Provide fabric with post-consumer recycled content.
3. Acoustical Properties: NRC numbers in accordance with ASTM C423 for Type A mounting. Certifiable acoustical data must be provided by an NVLAP-approved, independent testing laboratory.

a. Sound Absorption Coefficients (Fabric Finish – 2’ Spaced Arrangement):

125 Hz	1.42	1000 Hz	2.13
250 Hz	1.61	2000 Hz	1.89
500 Hz	2.19	4000 Hz	1.75
		NRC	1.95

b. Sound Absorption Coefficients (Fabric Finish – Abutted):

125 Hz	.90	1000 Hz	1.40
250 Hz	1.07	2000 Hz	1.31
500 Hz	1.40	4000 Hz	1.27
		NRC	1.30

D. MegaWedge™ Diffsorber Vinyl Finish Panels: Mineral wool core with fiberglass mat front and back; square edges; two (2) ft width of absorber slopes from 3-3/16-inch thick on one (1) side to 5-3/16-inch on other side.

1. Core Properties: Flame spread of zero (0), smoke developed rating of zero (0); minimum tensile strength of 2631 lbs/sq ft breaking load, and compressive resistance of 480 lbs/sq ft at 10 percent compression, and horizontal sag of not more than 1/2-inch in four (4) ft.
2. Vinyl Facing: Selected from manufacturer’s standard micro-perforated vinyl. Bond vinyl to face and edges and return at edges a minimum of two (2) inches on back of panels. Provide panels with flat, wrinkle-free surface and tailored corners.
 - a. Rating: Rating of vinyl used determines rating of panel as a unit.
3. Acoustical Properties: NRC numbers in accordance with ASTM C423 for Type A mounting. Certifiable acoustical data must be provided by an NVLAP-approved, independent testing laboratory.

- a. Sound Absorption Coefficients (Vinyl Finish – 2’ Spaced Arrangement):

125 Hz	.50	1000 Hz	1.35
250 Hz	1.01	2000 Hz	1.23
500 Hz	1.29	4000 Hz	1.23
		NRC	1.20

- b. Sound Absorption Coefficients (Vinyl Finish – Abutted):

125 Hz	.97	1000 Hz	1.11
250 Hz	1.03	2000 Hz	1.06
500 Hz	1.04	4000 Hz	.85
		NRC	1.05

- E. MaxWedge™ Diffsorber Fabric Finish Panels: Mineral wool core with fiberglass mat front and back; square edges; two (2) ft width of absorber slopes from 1-inch thick on one (1) side to 7-inch on other side.

1. Core Properties: Flame spread of zero (0), smoke developed rating of zero (0); minimum tensile strength of 2631 lbs/sq ft breaking load, and compressive resistance of 480 lbs/sq ft at 10 percent compression, and horizontal sag of not more than 1/2-inch in four (4) ft.
2. Fabric Facing: Selected from manufacturer’s standard fabric. Bond fabric to face and edges and return at edges a minimum of two (2) inches on back of panels. Provide panels with flat, wrinkle-free surface and tailored corners.
 - a. Rating: Rating of fabric used determines rating of panel as a unit.
 - b. Recycled Content: Provide fabric with post-consumer recycled content.
3. Acoustical Properties: NRC numbers in accordance with ASTM C423 for Type A mounting. Certifiable acoustical data must be provided by an NVLAP-approved, independent testing laboratory.
 - a. Sound Absorption Coefficients (Fabric Finish – 2’ Spaced Arrangement):

125 Hz	1.28	1000 Hz	2.40
250 Hz	1.71	2000 Hz	2.08
500 Hz	2.51	4000 Hz	1.90
		NRC	2.20

- F. EconoWedge™ Diffsorber Fabric Finish Panels: Mineral wool core with fiberglass mat front and back; two (2) square edges; four (4) ft width of absorber slopes from 1-3/16-inch thick on one (1) side to 3-3/16-inch on other side.

1. Core Properties: Flame spread of zero (0), smoke developed rating of zero (0); minimum tensile strength of 2631 lbs/sq ft breaking load, and compressive resistance of 480 lbs/sq ft at 10 percent compression, and horizontal sag of not more than 1/2-inch in four (4) ft.
2. Fabric Facing: Selected from manufacturer’s standard fabric. Bond fabric to face and edges and return at edges a minimum of two (2) inches on back of panels. Provide panels with flat, wrinkle-free surface and tailored corners.
 - a. Rating: Rating of fabric used determines rating of panel as a unit.
 - b. Recycled Content: Provide fabric with post-consumer recycled content.
3. Acoustical Properties: NRC numbers in accordance with ASTM C423 for Type A mounting. Certifiable acoustical data must be provided by an NVLAP-approved, independent testing laboratory.

- a. Sound Absorption Coefficients (Fabric Finish – 2’ Spaced Arrangement):

125 Hz	.50	1000 Hz	1.86
250 Hz	1.10	2000 Hz	1.63
500 Hz	1.72	4000 Hz	1.48
		NRC	1.60

- b. Sound Absorption Coefficients (Fabric Finish – Abutted):

125 Hz	.50	1000 Hz	1.35
250 Hz	1.01	2000 Hz	1.23
500 Hz	1.29	4000 Hz	1.23
		NRC	1.20

- G. EconoMegaWedge™ Diffisorber Fabric Finish Panels: Mineral wool core with fiberglass mat front and back; two (2) square edges; four (4) ft width of absorber slopes from 3-3/16-inch thick on one (1) side to 5-3/16-inch on other side.

1. Core Properties: Flame spread of zero (0), smoke developed rating of zero (0); minimum tensile strength of 2631 lbs/sq ft breaking load, and compressive resistance of 480 lbs/sq ft at 10 percent compression, and horizontal sag of not more than 1/2-inch in four (4) ft.
2. Fabric Facing: Selected from manufacturer’s standard fabric. Bond fabric to face and edges and return at edges a minimum of two (2) inches on back of panels. Provide panels with flat, wrinkle-free surface and tailored corners.
 - a. Rating: Rating of fabric used determines rating of panel as a unit.
 - b. Recycled Content: Provide fabric with post-consumer recycled content.
3. Acoustical Properties: NRC numbers in accordance with ASTM C423 for Type A mounting. Certifiable acoustical data must be provided by an NVLAP-approved, independent testing laboratory.

- a. Sound Absorption Coefficients (Fabric Finish – 2’ Spaced Arrangement):

125 Hz	1.42	1000 Hz	2.13
250 Hz	1.61	2000 Hz	1.89
500 Hz	2.19	4000 Hz	1.75
		NRC	1.95

- b. Sound Absorption Coefficients (Fabric Finish – Abutted):

125 Hz	.90	1000 Hz	1.40
250 Hz	1.07	2000 Hz	1.31
500 Hz	1.40	4000 Hz	1.27
		NRC	1.30

- H. EconoMaxWedge™ Diffisorber Fabric Finish Panels: Mineral wool core with fiberglass mat front and back; two (2) square edges; four (4) ft width of absorber slopes from 1-inch thick on one (1) side to 7-inch on other side.

1. Core Properties: Flame spread of zero (0), smoke developed rating of zero (0); minimum tensile strength of 2631 lbs/sq ft breaking load, and compressive resistance of 480 lbs/sq ft at 10 percent compression, and horizontal sag of not more than 1/2-inch in four (4) ft.

2. Fabric Facing: Selected from manufacturer’s standard fabric. Bond fabric to face and edges and return at edges a minimum of two (2) inches on back of panels. Provide panels with flat, wrinkle-free surface and tailored corners.
 - a. Rating: Rating of fabric used determines rating of panel as a unit.
 - b. Recycled Content: Provide fabric with post-consumer recycled content.
3. Acoustical Properties: NRC numbers in accordance with ASTM C423 for Type A mounting. Certifiable acoustical data must be provided by an NVLAP-approved, independent testing laboratory.
 - a. Sound Absorption Coefficients (Fabric Finish – 2’ Spaced Arrangement):

125 Hz	1.28	1000 Hz	2.40
250 Hz	1.71	2000 Hz	2.08
500 Hz	2.51	4000 Hz	1.90
		NRC	2.20

2.3 SOUND-DIFFUSIVE PANELS AND SOUND-REFLECTIVE PANELS

Specifier Note: Select one of the options from the following paragraphs and delete the others.

- A. Wedge™ Diffuser Fabric Finish: 0.20-inch thick high-impact styrene weighing approximately 1-1/2 lbs/sq ft; square edges; two (2) ft width of diffuser slopes from 1-1/4-inch thick on one (1) side to 3-1/4-inch on other side. Panel consists of end-to-end series of complex chambers diffusing sound in all directions and at all frequencies from 400 Hz to 12,000 Hz, as proven by testing in both time domain and frequency domain. Diffusion chambers are based on manufacturer’s patent using formulas on non-incident mathematics and cannot be used without permission.
 1. Fabric Facing: Selected from manufacturer’s standard fabric. Bond fabric to face and edges and return at edges a minimum of two (2) inches on back of panels. Provide fabric-wrapped panels with flat, wrinkle-free surface and tailored corners.
 2. Acoustical Properties: Absorption numbers in accordance with ASTM C423 for Type A mounting. Certifiable acoustical data must be provided by an NVLAP-approved, independent testing laboratory.

- a. Sound Absorption Coefficients:

100 Hz	.28	500 Hz	.26
125 Hz	.32	1000 Hz	.23
250 Hz	.31	2000 Hz	.13
		NRC	.25

- b. Sound Absorption Coefficients (Fabric Finish):

100 Hz	.34	500 Hz	.58
125 Hz	.33	1000 Hz	.57
250 Hz	.40	2000 Hz	.54
		NRC	.50

- B. MegaWedge™ Diffuser Fabric Finish: 0.20-inch thick high-impact styrene weighing approximately 1-1/2 lbs/sq ft; square edges; two (2) ft width of diffuser slopes from 3-1/4-inch thick on one (1) side to 5-1/4-inch on other side. Panel consists of end-to-end series of complex chambers diffusing sound in all directions and at all frequencies from 400 Hz to 12,000 Hz, as proven by testing in both time domain and frequency domain. Diffusion chambers are based on manufacturer’s patent using formulas on non-incident mathematics and cannot be used without permission.

1. Fabric Facing: Selected from manufacturer’s standard fabric. Bond fabric to face and edges and return at edges a minimum of two (2) inches on back of panels. Provide fabric-wrapped panels with flat, wrinkle-free surface and tailored corners.
2. Acoustical Properties: Absorption numbers in accordance with ASTM C423 for Type A mounting. Certifiable acoustical data must be provided by an NVLAP-approved, independent testing laboratory.

a. Sound Absorption Coefficients:

100 Hz	.28	500 Hz	.26
125 Hz	.32	1000 Hz	.23
250 Hz	.31	2000 Hz	.13
		NRC	.25

b. Sound Absorption Coefficients (Fabric Finish):

100 Hz	.34	500 Hz	.58
125 Hz	.33	1000 Hz	.57
250 Hz	.40	2000 Hz	.54
		NRC	.50

- C. Wedge™ Reflector Fabric Finish: 0.20-inch thick high-impact styrene weighing approximately one (1) lb/sq ft; square edges; two (2) ft width of absorber slopes from 1-1/4-inch thick on one (1) side to 3-1/4-inch on other side. Face to be flat or slightly curved to provide reflective properties.

1. Fabric Facing: Selected from manufacturer’s standard fabric. Bond fabric to face and edges and return at edges a minimum of two (2) inches on back of panels. Provide fabric-wrapped panels with flat, wrinkle-free surface and tailored corners.
2. Acoustical Properties: Absorption numbers in accordance with ASTM C423 for Type A mounting. Certifiable acoustical data must be provided by an NVLAP-approved, independent testing laboratory.

a. Sound Absorption Coefficients:

100 Hz	.30	500 Hz	.17
125 Hz	.23	1000 Hz	.14
250 Hz	.22	2000 Hz	.16
		NRC	.20

b. Sound Absorption Coefficients (Fabric Finish):

100 Hz	.27	500 Hz	.14
125 Hz	.26	1000 Hz	.13
250 Hz	.21	2000 Hz	.20
		NRC	.25

- D. MegaWedge™ Reflector Fabric Finish: 0.20-inch thick high-impact styrene weighing approximately one (1) lb/sq ft; square edges; two (2) ft width of absorber slopes from 3-1/4-inch thick on one (1) side to 5-1/4-inch on other side. Face to be flat or slightly curved to provide reflective properties.

1. Fabric Facing: Selected from manufacturer's standard fabric. Bond fabric to face and edges and return at edges a minimum of two (2) inches on back of panels. Provide fabric-wrapped panels with flat, wrinkle-free surface and tailored corners.
2. Acoustical Properties: Absorption numbers in accordance with ASTM C423 for Type A mounting. Certifiable acoustical data must be provided by an NVLAP-approved, independent testing laboratory.

a. Sound Absorption Coefficients:

100 Hz	.30	500 Hz	.17
125 Hz	.23	1000 Hz	.14
250 Hz	.22	2000 Hz	.16
		NRC	.20

b. Sound Absorption Coefficients (Fabric Finish):

100 Hz	.27	500 Hz	.14
125 Hz	.26	1000 Hz	.13
250 Hz	.21	2000 Hz	.20
		NRC	.25

2.4 ACCESSORIES

- A. Fastening Devices: Manufacturer's standard "Concealed Multiple-Perforation Fastening Devices" (EZ-Clips). Provide in the following quantities:
 1. Four (4) per 4 x 4 ft panel.
 2. Six (6) per 4 x 6 ft panel.
 3. Eight (8) per 4 x 8 ft panel.
- B. Adhesives: As recommended by manufacturer with a VOC content of [70] [Insert number] g/L or less when calculated in accordance with 40 CFR 59, Subpart D (EPA Method 24).

Specifier Note: Retain either one (1) of the following paragraphs if Diffusers or Reflectors are included in project. Delete both paragraphs if Diffusers or Reflectors are not used.

- C. Ceiling Hangers: 14-gage stainless steel wire.
- D. Wall Fasteners: Minimum No. 10 screw or bolt and washer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements that affect installation and with requirements for installation tolerances. Notify the Architect in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure wall areas to receive panels and establish layout to balance border widths at opposite edges of each area. Avoid using less-than-half-width panels at borders, and comply with layout shown on wall elevations.

- B. Coordinate work that penetrates the walls. Provide cutouts for wall-mounted items and penetrations accurately and cleanly.

3.3 INSTALLATION

- A. Install in strict accordance with manufacturer's written installation instructions and recommendations and approved shop drawings. Coordinate installation with adjacent work to ensure proper clearances.
- B. Install each EZ-Clip on the wall, with attachment screws appropriate to the substrate, so that it will impale the panel approximately six (6) inches in from each corner and approximately six (6) inches in from each side on longer panels.
- C. Apply paneling adhesive in a 3/8-inch bead on fabric 1-1/2 inches in from edge before impaling panel on EZ-Clips.
- D. Make all required field alterations in accordance with manufacturer's written instructions.

Specifier Note: Retain either one (1) of the following paragraphs if Diffusers or Reflectors are included in project. Delete both paragraphs if Diffusers or Reflectors are not used.

- E. Manufacture ceiling [Diffusers] [Reflectors] to lie flat and fit tightly in acoustical ceiling T-grid in place of one (1) 2' x 4' or two (2) 2' x 2' ceiling tiles.
- F. Manufacture wall [Diffusers] [Reflectors] with built-in angle brackets for attachment to substrate.

3.4 CLEANING AND PROTECTION

- A. Clean exposed surfaces of panels in accordance with manufacturer's recommendations.
- B. Protect installed panels from damage or soiling until completion of project.
- C. Remove and replace panels that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION