**Price Quarter & Half Round Displacement Diffusers**

**Division 23 – Heating, Ventilating, and Air Conditioning**

**Section 23 37 13 – Diffusers, Registers, and Grilles**

**PART 1 – GENERAL**

* 1. **Section includes**:
1. Quarter Round Displacement Diffusers.
2. Half Round Displacement Diffusers.
	1. **Related Requirements**
3. Section 01 30 00 – Administrative Requirements
4. Section 01 40 00 – Quality Requirements
5. Section 01 60 00 – Product Requirements
6. Section 01 74 19 – Construction/Demolition Waste Management and Disposal
7. Section 01 78 00 – Closeout Submittals
8. Section 01 79 00 – Demonstration and Training
9. Section 23 31 00 – HVAC Ducts and Casings
10. Section 23 32 00 – Air Plenums and Chases

**1.03 Reference Standards**

1. All referenced standards and recommended practices in this section pertain to the most recent publication thereof, including all addenda and errata.
2. ASHRAE 55 – Thermal Environmental Conditions for Human Occupancy
3. ASHRAE 70 – Method of Testing the Performance of Air Outlets and Air Inlets
4. ASHRAE 170 – Ventilation of Health Care Facilities
5. ASTM D610 – Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces
6. ASTM D714 – Standard Test Method for Evaluating Degree of Blistering of Paints
7. ASTM D1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
8. ASTM D4752 – Standard Practice for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub

**1.04 Administrative Requirements**

1. Pre-installation Meeting: Conduct a pre-installation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
2. Sequencing: Ensure that utility connections are achieved in an orderly and efficient manner.

**1.05 Submittals**

1. See Section 01 30 00 – Administrative Requirements for submittal procedures.
2. Product Data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings that indicate airflow, static pressure, and sound power levels for each of the second through sixth octave bands in dBA.
3. Shop Drawings: Indicate configuration, general assembly, and materials used in fabrication.
4. Certificates: Certify that air capacities, pressure drops, and selection procedures meet or exceed specified requirements.
5. Manufacturer's Installation Instructions: Indicate support details, installation instructions, recommendations, and service clearances required.
6. Project Record Documents: Record actual locations of units and control components.
7. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists.
8. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

**1.06 Quality Assurance**

1. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
2. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

**1.07 Warranty**

1. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
2. Provide 12 month manufacturer warranty from date of shipment for displacement diffusers.

**PART 2 – PRODUCTS**

**2.01** **Quarter Round Displacement Diffusers**

1. Basis of Design: Price Industries, Inc.
2. Quarter Round 90° Displacement Diffuser: Model DR90
3. Quarter Round Horizontal 90° Displacement Diffuser: Model DR90H
4. Performance:
5. The diffuser manufacturer shall provide sound and pressure drop data derived from tests in accordance with ASHRAE 70.
6. Performance data for Draft Rate (%DR) shall be provided based on tests in accordance with ASHRAE 55.
7. A software program shall be available to aid in performance assessment by allowing room comfort evaluation for specific operating conditions and diffuser locations.
	* 1. If evaluation software is not available, the manufacturer shall supply, free of charge, a CFD model of the representative spaces completed by a modeling contractor who has demonstrable qualifications to model such a space.
		2. The qualifications shall include no less than 10 years of experience in the modeling of displacement ventilation systems, thorough validation of the code through comparison to empirical data, as well as a list of references.

**2.02** **Quarter Round 90° Displacement Diffusers**

1. General:
2. Furnish and install Price Model DR90 quarter round displacement diffuser with the sizes, capacities, and options as indicated on the plans and air outlet schedule.
3. The displacement diffuser shall deliver air to the occupied space at low noise levels, with uniform, low velocity distribution of supply air.
4. Construction:
5. The displacement diffuser shall be constructed with an equalization baffle behind the operative diffuser face for uniform, low velocity distribution of supply air. Plastic nozzle arrays or any plastic components shall be unacceptable.
6. The equalization baffle and the diffuser face shall be securely retained in the diffuser frame.
7. The operative face shall be 18 gauge painted steel, and top and bottom panels shall be 20 gauge painted steel. The diffuser frame shall be extruded aluminum construction for rigidity and protection of the operative face and side panels. The internal baffling shall be aluminum construction.
8. There shall be no visible fasteners on the front or side panels.
9. The diffuser shall allow duct connection at the [top], [bottom] or [rear] of the diffuser with a [factory] or [field] cut inlet.
10. Mounting/Fastening:
	1. The diffuser shall fasten to the wall via a rail mounting system. The rail mounting system shall not require puncturing the diffuser for installation.
	2. The rail mounting system shall include metal cover strips to conceal all visible fasteners.
11. Finish:
12. All steel components shall have B12 White baked-on powder coat finish. Epoxies and their derivatives shall not be acceptable. Visible non-metallic components shall not be acceptable.
13. The paint finish must demonstrate no degradation when tested in accordance with ASTM D1308 (covered and spot immersion) and ASTM D4752 (MEK double rub) paint durability tests.
14. The paint film thickness shall be a minimum of 2.0 mils.
15. The finish shall have a hardness of 2H.
16. The finish shall withstand a minimum salt spray exposure of 500 hours with no measurable creep in accordance with ASTM D1654, and 1000 hours of exposure with no rusting or blistering as per ASTM D610 and ASTM D714.
17. The finish shall have an impact resistance of 80 inch-pounds.
18. Options:
	1. Adjustable Flow Sensing Device (AFSD):
		1. The diffuser shall be supplied with an AFSD which features both a manually adjustable damper for volume control and a multipoint sensor for accurate pressure measurement.
		2. The AFSD shall be provided with gauge taps for flow measurement.
		3. The AFSD shall include a damper locking mechanism to ensure quick and accurate balancing of each diffuser during the balancing process.
	2. Duct Cover:
		1. The diffuser shall be supplied with a duct cover with 18 gauge [perforated] or [solid] steel panels. The frames shall be aluminum extrusion construction for rigidity and protection of the face and side panels.
		2. The duct cover shall be supplied with a rail mounting system with metal cover strips to conceal all fasteners.
		3. The duct cover shall be manufactured by the diffuser manufacturer, factory assembled, and shipped complete with the associated diffuser.
		4. There shall be no visible fasteners on the duct cover panels. Visible non-metallic components shall not be acceptable.
		5. The duct covers shall have a finish to match the associated diffuser, or as selected by the architect.

**2.03** **Quarter Round Horizontal 90° Displacement Diffusers**

1. General:
2. Furnish and install Price Model DR90H quarter round horizontal displacement diffuser with the sizes, capacities, and options as indicated on the plans and air outlet schedule.
3. The displacement diffuser shall deliver air to the occupied space at low noise levels, with uniform, low velocity distribution of supply air.
4. Construction:
5. The displacement diffuser shall be constructed with an equalization baffle behind the operative diffuser face for uniform, low velocity distribution of supply air. Plastic nozzle arrays or any plastic components shall be unacceptable.
6. The equalization baffle and the diffuser face shall be securely retained in the diffuser frame.
7. The operative face shall be 18 gauge painted steel, and top and bottom panels shall be 20 gauge painted steel. The diffuser frame shall be extruded aluminum construction for rigidity and protection of the operative face and side panels. The internal baffling shall be aluminum construction.
8. There shall be no visible fasteners on the front or side panels.
9. The diffuser shall allow duct connection at the [top], [rear] or [side] of the diffuser with a [factory] or [field] cut inlet.
10. Mounting/Fastening:
11. The diffuser shall fasten to the wall and ceiling via a rail mounting system. The rail mounting system shall not require puncturing the diffuser for installation.
12. The rail mounting system shall include metal cover strips to conceal all visible fasteners.
13. Finish:
14. All steel components shall have B12 White baked-on powder coat finish. Epoxies and their derivatives shall not be acceptable. Visible non-metallic components shall not be acceptable.
15. The paint finish must demonstrate no degradation when tested in accordance with ASTM D1308 (covered and spot immersion) and ASTM D4752 (MEK double rub) paint durability tests.
16. The paint film thickness shall be a minimum of 2.0 mils.
17. The finish shall have a hardness of 2H.
18. The finish shall withstand a minimum salt spray exposure of 500 hours with no measurable creep in accordance with ASTM D1654, and 1000 hours of exposure with no rusting or blistering as per ASTM D610 and ASTM D714.
19. The finish shall have an impact resistance of 80 inch-pounds.
20. Options:
21. Adjustable Flow Sensing Device (AFSD):
22. The diffuser shall be supplied with an AFSD which features both a manually adjustable damper for volume control and a multipoint sensor for accurate pressure measurement.
23. The AFSD shall be provided with gauge taps for flow measurement.
24. The AFSD shall include a damper locking mechanism to ensure quick and accurate balancing of each diffuser during the balancing process.
25. Duct Cover:
	1. The diffuser shall be supplied with a duct cover with 18 gauge [perforated] or [solid] steel panels. The frames shall be aluminum extrusion construction for rigidity and protection of the face and side panels.
	2. The duct cover shall be supplied with a rail mounting system with metal cover strips to conceal all fasteners.
	3. The duct cover shall be manufactured by the diffuser manufacturer, factory assembled, and shipped complete with the associated diffuser.
	4. There shall be no visible fasteners on the duct cover panels. Visible non-metallic components shall not be acceptable.
	5. The duct covers shall have a finish to match the associated diffuser, or as selected by the architect.

**2.04** **Half Round Displacement Diffusers**

1. Basis of Design: Price Industries, Inc.
2. Half Round 180° Displacement Diffuser: Model DR180
3. Half Round U-Shaped 180° Displacement Diffuser: Model DR180U
4. Performance:
5. The diffuser manufacturer shall provide sound and pressure drop data derived from tests in accordance with ASHRAE 70.
6. Performance data for Draft Rate (%DR) shall be provided based on tests in accordance with ASHRAE 55.
7. A software program shall be available to aid in performance assessment by allowing room comfort evaluation for specific operating conditions and diffuser locations.
8. If evaluation software is not available, the manufacturer shall supply, free of charge, a CFD model of the representative spaces completed by a modeling contractor who has demonstrable qualifications to model such a space.
9. The qualifications shall include no less than 10 years of experience in the modeling of displacement ventilation systems, thorough validation of the code through comparison to empirical data, as well as a list of references.

**2.05** **Half Round 180° Displacement Diffusers**

1. General:
2. Furnish and install Price Model DR180 half round displacement diffuser with the sizes, capacities, and options as indicated on the plans and air outlet schedule.
3. The displacement diffuser shall deliver air to the occupied space at low noise levels, with uniform, low velocity distribution of supply air.
4. Construction:
5. The displacement diffuser shall be constructed with an equalization baffle behind the operative diffuser face for uniform, low velocity distribution of supply air. Plastic nozzle arrays or any plastic components shall be unacceptable.
6. The equalization baffle and the diffuser face shall be securely retained in the diffuser frame.
7. The operative face shall be 18 gauge painted steel, and top and bottom panels shall be 20 gauge painted steel. The diffuser frame shall be extruded aluminum construction for rigidity and protection of the operative face and side panels. The internal baffling shall be aluminum construction.
8. There shall be no visible fasteners on the front or side panels.
9. The diffuser shall allow duct connection at the [top], [bottom] or [rear] of the diffuser with a [factory] or [field] cut inlet.
10. Mounting/Fastening:
11. The diffuser shall fasten to the wall via a rail mounting system. The rail mounting system shall not require puncturing the diffuser for installation.
12. The rail mounting system shall include metal cover strips to conceal all visible fasteners.
13. Finish:
14. All steel components shall have B12 White baked-on powder coat finish. Epoxies and their derivatives shall not be acceptable. Visible non-metallic components shall not be acceptable.
15. The paint finish must demonstrate no degradation when tested in accordance with ASTM D1308 (covered and spot immersion) and ASTM D4752 (MEK double rub) paint durability tests.
16. The paint film thickness shall be a minimum of 2.0 mils.
17. The finish shall have a hardness of 2H.
18. The finish shall withstand a minimum salt spray exposure of 500 hours with no measurable creep in accordance with ASTM D1654, and 1000 hours of exposure with no rusting or blistering as per ASTM D610 and ASTM D714.
19. The finish shall have an impact resistance of 80 inch-pounds.
20. Options:
21. Adjustable Flow Sensing Device (AFSD):
22. The diffuser shall be supplied with an AFSD which features both a manually adjustable damper for volume control and a multipoint sensor for accurate pressure measurement.
23. The AFSD shall be provided with gauge taps for flow measurement.
24. The AFSD shall include a damper locking mechanism to ensure quick and accurate balancing of each diffuser during the balancing process.
25. Base:
26. The diffuser shall be supplied with a mounting base to allow for access to the inlet of the diffuser if ducted from below.
27. The base shall have an extruded aluminum frame and 20 gauge solid steel face and finished to match the diffuser.
28. Duct Cover:
29. The diffuser shall be supplied with a duct cover with 18 gauge [perforated] or [solid] steel panels. The frames shall be aluminum extrusion construction for rigidity and protection of the face and side panels.
30. The duct cover shall be supplied with a rail mounting system with metal cover strips to conceal all fasteners.
31. The duct cover shall be manufactured by the diffuser manufacturer, factory assembled, and shipped complete with the associated diffuser.
32. There shall be no visible fasteners on the duct cover panels. Visible non-metallic components shall not be acceptable.
33. The duct covers shall have a finish to match the associated diffuser, or as selected by the architect.
34. Protective Film:
35. The diffuser shall be supplied with protective film on the diffuser face and inlet to protect from external contaminants prior to installation.

**2.06** **Half Round U-shaped 180° Displacement Diffusers**

1. General:
2. Furnish and install Price Model DR180U half round U-shaped displacement diffuser with the sizes, capacities, and options as indicated on the plans and air outlet schedule.
3. The displacement diffuser shall deliver air to the occupied space at low noise levels, with uniform, low velocity distribution of supply air.
4. Construction:
5. The displacement diffuser shall be constructed with an equalization baffle behind the operative diffuser face for uniform, low velocity distribution of supply air. Plastic nozzle arrays or any plastic components shall be unacceptable.
6. The equalization baffle and the diffuser face shall be securely retained in the diffuser frame.
7. The operative face shall be 18 gauge painted steel, and top and bottom panels shall be 20 gauge painted steel. The diffuser frame shall be extruded aluminum construction for rigidity and protection of the operative face and side panels. The internal baffling shall be aluminum construction.
8. There shall be no visible fasteners on the front or side panels.
9. The diffuser shall allow duct connection at the [top], [bottom] or [rear] of the diffuser with a [factory] or [field] cut inlet.
10. Mounting/Fastening:
11. The diffuser shall fasten to the wall via a rail mounting system. The rail mounting system shall not require puncturing the diffuser for installation.
12. The rail mounting system shall include metal cover strips to conceal all visible fasteners.
13. Finish:
14. All steel components shall have B12 White baked-on powder coat finish. Epoxies and their derivatives shall not be acceptable. Visible non-metallic components shall not be acceptable.
15. The paint finish must demonstrate no degradation when tested in accordance with ASTM D1308 (covered and spot immersion) and ASTM D4752 (MEK double rub) paint durability tests.
16. The paint film thickness shall be a minimum of 2.0 mils.
17. The finish shall have a hardness of 2H.
18. The finish shall withstand a minimum salt spray exposure of 500 hours with no measurable creep in accordance with ASTM D1654, and 1000 hours of exposure with no rusting or blistering as per ASTM D610 and ASTM D714.
19. The finish shall have an impact resistance of 80 inch-pounds.
20. Options:
21. Adjustable Flow Sensing Device (AFSD):
22. The diffuser shall be supplied with an AFSD which features both a manually adjustable damper for volume control and a multipoint sensor for accurate pressure measurement.
23. The AFSD shall be provided with gauge taps for flow measurement.
24. The AFSD shall include a damper locking mechanism to ensure quick and accurate balancing of each diffuser during the balancing process.
25. Base:
	1. The diffuser shall be supplied with a mounting base to allow for access to the inlet of the diffuser if ducted from below.
	2. The base shall have an extruded aluminum frame and 20 gauge solid steel face and finished to match the diffuser.
26. Duct Cover:
	1. The diffuser shall be supplied with a duct cover with 18 gauge [perforated] or [solid] steel panels. The frames shall be aluminum extrusion construction for rigidity and protection of the face and side panels.
	2. The duct cover shall be supplied with a rail mounting system with metal cover strips to conceal all fasteners.
	3. The duct cover shall be manufactured by the diffuser manufacturer, factory assembled, and shipped complete with the associated diffuser.
	4. There shall be no visible fasteners on the duct cover panels. Visible non-metallic components shall not be acceptable.
	5. The duct covers shall have a finish to match the associated diffuser, or as selected by the architect.
27. Protective Film:
	1. The diffuser shall be supplied with protective film on the diffuser face and inlet to protect from external contaminants prior to installation.

**PART 3 – EXECUTION**

**3.01 Examination**

* 1. Verify that conditions are suitable for installation.
	2. Verify that field measurements are as shown on the drawings.

**3.02 Installation**

1. Install in accordance with manufacturer’s instructions.
2. See drawings for the size(s) and locations of displacement diffusers.
3. Connect to ductwork in accordance with Section 23 31 00.

**3.03 Adjusting**

1. Ensure supply air to the displacement diffusers by performing pitot traverse of the main supply duct.
2. Balance outlets according to manufacturer’s recommendations.
3. Verify that field measurements are as shown on the drawings.

**3.04 Field Quality Control**

1. See Section 01 40 00 – Quality Requirements for additional requirements.

**3.05 Cleaning**

1. See Section 01 74 19 – Construction Waste Management and Disposal for additional requirements.

**3.06 Closeout Activities**

1. See Section 01 78 00 – Closeout Submittals for closeout documentation requirements.
2. See Section 01 79 00 – Demonstration and Training for additional requirements.