# SECTION 23 37 13

# DIFFUSERS, REGISTERS & GRILLES

**BASED ON DFD MASTER SPECIFICATION DATED 7/11/2023**

This section has been written to cover most (but not all) situations that you will encounter. Depending on the requirements of your specific project, you may have to add material, delete items, or modify what is currently written. The Division Facilities Development expects changes and comments from you.

# PART 1 ‑ GENERAL

## SCOPE

This section includes specifications for air terminal equipment. Included are the following topics:

PART 1 - GENERAL

Scope

Related Work

Reference

Reference Standards

Quality Assurance

Submittals

Design Criteria

PART 2 - PRODUCTS

Manufacturers

Linear Slot Diffusers

Linear Bar Diffusers and Grilles

Round Ceiling Diffusers

Perforated Ceiling Diffusers

Square Ceiling Diffusers - High Performance

Square Ceiling Diffusers - Plaque

Square Ceiling Diffusers

Plenum Slot Diffusers - 180 Degree Adjustable

Plenum Slot Diffusers - with Gasketed Blade

Security Grille

Sidewall Registers and Grilles

Eggcrate Grille

Heavy Duty Sidewall Return/Exhaust Grille

Door Grille

Drum Diffuser

Laboratory Supply Diffuser

Perforated Duct Diffuser

PART 3 - EXECUTION

Installation

Construction Verification Items

## RELATED WORK

Section 01 91 01 or 01 91 02 - Commissioning Process

Section 23 08 00 - Commissioning of HVAC

Section 23 31 00 - HVAC Ducts and Casings

Section 23 33 00 - Air Duct Accessories

Section 23 05 93 - Testing, Adjusting and Balancing for HVAC

## REFERENCE

Applicable provisions of Division 1 govern work under this section.

## REFERENCE STANDARDS

NFPA 90A - Installation of Air Conditioning and Ventilation Systems.

UL 181 - Factory-Made Air Ducts and Connectors.

ARI-ADC Standard 880.

## QUALITY ASSURANCE

Refer to division 1, General Conditions, Equals and Substitutions.

## SUBMITTALS

Refer to division 1, General Conditions, Submittals.

Furnish submittal information including, but not limited to, the following:

* Manufacturer's name and model number
* Identification as referenced in the documents
* Capacities/ratings
* Materials of construction
* Sound ratings
* Dimensions
* Finish
* Color selection charts where applicable
* Manufacturer's installation instructions
* All other appropriate data

## DESIGN CRITERIA

All performance data shall be based on tests conducted in accordance with Air Diffusion Council (ADC) Test Code 1062 GRD 84.

# PART 2 ‑ PRODUCTS

## MANUFACTURERS

Acceptable manufacturers for specific products are listed under each item.

All Diffusers, Registers and Grilles are specified without an opposed blade damper. There may be instances where an OBD is required due to installation details. DFD’s preference is installation of a balancing damper in the branch duct.

## LINEAR SLOT DIFFUSERS

Carnes CH, Nailor 5000, Price SDS, Shoemaker LSD, Titus ML.

Extruded aluminum with frame type appropriate to installation with diffuser elements being removable from frame. Both air pattern and flow rate adjustment with air pattern having full 180-degree adjustment. Single slot diffuser vanes segmented on 2 or 3-foot centers.

Coordinate frame & border type with Architectural ceiling / mounting details.

Diffuser lengths and slot sizes as shown on drawings and/or as scheduled.

White, baked enamel finish or powder coat finish, unless otherwise indicated. Flat black diffuser vanes and frame interior.

Provide diffusers with uninsulated galvanized steel plenum. Plenums constructed for specific diffuser frame and border type. Provide round or oval inlet collar designed to fit standard flexible duct sizes.

Specify in section 23 07 00 - Insulation, linear slot diffuser plenums are to be externally insulated.

## LINEAR BAR DIFFUSERS AND GRILLES

Carnes CC, CT and CW, Greenheck XG-2000, Metal Aire 2000, Nailor 4900, Price LBP, Shoemaker LF, LS and LC, Titus CT.

Extruded aluminum with frame type appropriate to side wall, sill or ceiling installation as indicated.

Diffuser and grille lengths, blade spacing, and blank off strips as shown on drawings and/or as scheduled.

Coordinate frame, border, and core type with Architectural mounting details.

Where frame and border types allow, provide supply air diffusers with straightening or equalizing vanes. Fixed blades at 0 or 15-degree deflection as scheduled. Bar support maximum 9" spacing.

White, anodized aluminum finish unless otherwise indicated.

Provide alignment strips/wires for end-to-end joining of sections for a continuous appearance when scheduled lengths exceed standard manufacturer lengths.

## ROUND CEILING DIFFUSERS

Carnes SSAA, Greenheck XG-3100, Metal Aire 3100, Nailor RNRA1, Price RCDA, Shoemaker RDA, Titus TMRA.

Spun aluminum or steel with uniform 360º discharge pattern.

Adjustable inner cones surrounded by a ceiling plate collar designed to reduce ceiling smudges.

Diffusers as shown on drawings and/or as scheduled.

White, baked enamel finish or powder coat finish, unless otherwise indicated.

## PERFORATED CEILING DIFFUSERS

Carnes SP and SL, Greenheck XG-7600, Metal Aire 7600, Nailor 4320S, Price PDS, Shoemaker 780, Titus PSS.

[Aluminum] [Steel] unless otherwise indicated and furnished with frame type appropriate to installation.

Field adjustable pattern controllers accessible through removable or hinged face plate. Pattern controller mounted directly under the neck of the diffuser and fully adjustable for either side blow or corner blow pattern.

Provide round or square neck duct adapters for each unit for top connection or side connection as appropriate to the space.

White, baked enamel finish or powder coat finish unless otherwise indicated. Flat black diffuser vanes and frame interior.

## SQUARE CEILING DIFFUSERS - High Performance

High performance type diffuser incorporating short throws and low NC levels.

Carnes SF, Greenheck XG-5800, Krueger 1400, Metal Aire 5800, Nailor RNS, Price SCD, Shoemaker FTD and HVD, Titus TMS.

[Aluminum] [Steel] unless otherwise indicated. Louvered face furnished with frame type appropriate to installation.

Diffuser shall have throw characteristics of a round diffuser having a 360º horizontal blow pattern.

Louver cones shall be one-piece construction with no corner joints.

White, baked enamel finish or powder coat finish, unless otherwise indicated.

## SQUARE CEILING DIFFUSERS - Plaque

Carnes SFPA and SHPA, Greenheck XG-5750, Krueger PLQ and 5PLQ, Metal Aire 5750, Nailor UNI2, Price SMDP, Shoemaker HL, Titus OMNI.

[Aluminum] [Steel] unless otherwise indicated. Louvered face furnished with frame type appropriate to installation.

Directional blow pattern as shown on the drawings and/or as scheduled.

One-piece removable square face plaque with one-piece back pan.

White, baked enamel finish or powder coat finish, unless otherwise indicated.

## SQUARE CEILING DIFFUSERS

Carnes SK and SE, Greenheck XG-5500 and 5500S, Krueger S, Metal Aire 5500 and 5500S, Nailor 6500 and 6200, Price SMD and AMD, Shoemaker DVD, Titus TDC and TDC-AA.

[Aluminum] [Steel] unless otherwise indicated. Louvered face furnished with frame type appropriate to installation.

Directional blow pattern as shown on the drawings and/or as scheduled.

One-piece construction louver cones with no corner joints.

White, baked enamel finish or powder coat finish, unless otherwise indicated.

## PLENUM SLOT DIFFUSER - 180 Degree Adjustable

Carnes DA, Greenheck XG-6600, Krueger PTBA, Metal Aire 6600, Nailor 5800, Price TBD3, Raymon-Donco SAT and XC, Shoemaker LSD, Titus TBD-30.

Steel, furnished with T-bars compatible with ceiling components. Vane air pattern and flow rate adjustment with air pattern having full 180-degree adjustment.

Provide 24-gauge galvanized steel [uninsulated] [insulated] plenum. Provide round or oval inlet collar designed to fit standard flexible duct sizes.

Specify in section 23 07 00 - Insulation, plenums are to be externally insulated.

Double metal thickness slot face.

White, baked enamel finish or powder coat finish, unless otherwise indicated. Flat black diffuser vanes and frame interior.

## PLENUM SLOT DIFFUSER - with Gasketed Blade

Carnes DA, Greenheck XG-PHP, Krueger PTBS, Metal Aire PHP, Nailor 5700, Price TBD4, Raymon-Donco BA and BS, Shoemaker LSD, Titus TBD-80.

Steel, furnished with T-bars compatible with ceiling components. Extruded aluminum pattern with a gasket on top edge to form a seal against the plenum wall or slot divider. Pattern control field adjustable from vertical to horizontal discharge.

Provide 24-gauge galvanized steel [uninsulated] [insulated] plenum. Provide round or oval inlet collar designed to fit standard flexible duct sizes.

Specify in section 23 07 00 - Insulation, plenums are to be externally insulated.

Double metal thickness slot face.

White, baked enamel finish or powder coat finish, unless otherwise indicated. Flat black diffuser vanes and frame interior.

## SECURITY GRILLE

Specify stainless steel grilles for wet cell applications.

Carnes RSPA25, Greenheck XG-SGRP, Krueger 310, Metal Aire SGRP, Nailor SG-PR, Shoemaker 1406, Titus SG-PR.

[304 Stainless] Steel 3/16" face plates with 5/16" diameter holes (maximum) on 7/16" staggered centers.

[304 Stainless] Steel 3/16" grille sleeve with welded seams. Sleeve length as shown on the drawings and/or as scheduled.

White, baked enamel finish or powder coat finish, unless otherwise indicated. Flat black diffuser vanes and frame interior.

## SIDEWALL REGISTERS AND GRILLES

Carnes R, Greenheck XG-4000, Krueger 880, Metal Aire 4000, Nailor 51DH, Price 520 (supply) and 530 (return/exhaust), Shoemaker 900, Titus 300 (supply) and 350 (return/exhaust).

[Aluminum] [Steel] unless otherwise indicated, with frame type appropriate to installation.

Register and grille sizes as shown on drawings and/or as scheduled.

White, baked enamel finish or powder coat finish, unless otherwise indicated.

Screw holes on surface counter sunk to accept recessed type screws.

***Choose from the following options for supply registers/grilles:***

Double deflection type blade supply registers and supply grilles allow deflection adjustment in all directions.

Opposed blade volume control damper supply registers, operable from face.

***Choose from the following options for return and exhaust registers/grilles:***

Fixed blade (0 or 45 degree) core return and exhaust registers and grilles.

Opposed blade volume control damper return registers, operable from face.

## EGGCRATE GRILLE

Carnes RAE and RAT, Greenheck XG-CC, Krueger EGC, Metal Aire CC, Nailor 51EC, Price 80, Shoemaker 600, Titus 50.

Aluminum construction with frame type appropriate to installation.

Grille face 1/2" x 1/2" or 1" x 1" grid pattern 1" deep with a minimum of 85% free area.

Grille sizes and finishes as shown on drawings and/or as scheduled.

White, baked enamel finish or powder coat finish, unless otherwise indicated.

Screw holes on surface counter sunk to accept recessed type screws.

## HEAVY DUTY SIDEWALL RETURN/EXHAUST GRILLE

Carnes Sturdicore, Krueger 480, Nailor 6100-HD, Price 91, Shoemaker 1610 and 1625, Titus 30.

Grille border 16-gauge steel and grille blades 14-gauge steel suitable for gymnasium applications.

Fixed blade (0 or 45 degree).

Grille sizes as shown on drawings and/or as scheduled.

White, baked enamel finish or powder coat finish, unless otherwise indicated.

## DOOR GRILLE

Carnes RF and RG, Greenheck XG-DG, Metal Aire DG, Nailor 51DGD, Price ATG and STG, Shoemaker 4000 and 4100, Titus 700.

[Aluminum] [Steel]. Sight tight.

Grille sizes, frame types, and finishes as shown on drawings and/or as scheduled.

White, baked enamel finish or powder coat finish, unless otherwise indicated.

## DRUM DIFFUSER

Greenheck XG-RH, Krueger DPL, Metal Aire RH, Nailor 45DL1, Price HCD.

Extruded aluminum with adjustable cylindrical drums and deflecting vanes. Minimum 60° angular adjustment of jet centerline rotating drum.

White, baked enamel finish or powder coat finish, unless otherwise indicated.

## LABORATORY SUPPLY DIFFUSER

Krueger TAD, Nailor 92RPD, Price RFD, Shoemaker 5185.

[304 stainless steel] [Aluminum with baked on epoxy] [White baked enamel or powder coat finish] with opposed blade volume control damper. Volume dampers steel, adjustable from diffuser face.

Diffuser removable perforated face with directional blades. Non-aspirating radial air pattern. Configured with air supply plenums with inlet collars to assure uniform discharge velocity over faces of units.

## PERFORATED DUCT DIFFUSER

United Sheet Metal SP or approved equal.

Perforated, spiral, paintable galvanized steel (ASTM-A257), 24-gauge lockseam duct with standing rib. Perforations open area of 23 percent.

Duct sizes, types, and accessories as shown on drawings and/or as scheduled.

# PART 3 ‑ EXECUTION

## INSTALLATION

Install grilles, registers and diffusers as shown on drawings and according to manufacturer's instructions.

Furnish diffusers with equalizing grids where it is not possible to maintain minimum 2 duct diameter straight duct into diffuser. Equalizing grids shall consist of individually adjustable vanes designed for equalizing airflow into diffuser neck and providing directional control of airflow.

Unless otherwise indicated, size ductwork drops to diffusers or grilles to match unit collar size.

Seal connections between ductwork drops and diffusers/grilles airtight.

Blank off unused portion of linear slot diffusers and linear bar diffusers and grilles.

Where diffusers, registers and grilles cannot be installed to avoid seeing inside duct, paint inside of duct with flat black paint to reduce visibility.

In clean rooms and animal holding rooms, caulk space between diffuser or grille and ceiling or wall to be air and watertight. User clear, non-hardening silicone sealant compatible with ceiling or wall surfaces. Sealant shall be resistant to microbiological growth.

## CONSTRUCTION VERIFICATION

Contractor is responsible for utilizing the construction verification checklists supplied under specification Section 23 08 00 in accordance with the procedures defined for construction verification in Section 01 91 01 or 01 91 02.

END OF SECTION