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

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

The following specification is for a defined application. Global IFS would be pleased to assist in developing a specification for your specific need.

**PART 1 – GENERAL**

* 1. **Summary**
1. This section includes the following:
	* + 1. Modular Horizontal Displacement Floor Diffusers

**1.02 Related Documents**

1. Section 01 30 00 – Administrative Requirements
2. Section 01 40 00 – Quality Requirements
3. Section 01 60 00 – Product Requirements
4. Section 01 74 19 – Construction/Demolition Waste Management and Disposal
5. Section 01 78 00 – Closeout Submittals
6. Section 01 79 00 – Demonstration and Training
7. Section 23 30 00 – HVAC Air Distribution
8. Section 23 32 00 – Air Plenums and Chases
	1. **Reference Standards**
9. All referenced standards and recommended practices in this section pertain to the most recent publication thereof, including all addenda and errata.
10. ASHRAE Standard 55 – Thermal Environmental Conditions for Human Occupancy
11. ASHRAE Standard 62.1 – Standards for Ventilation and Indoor Air Quality
12. ASHRAE Standard 70 – Method of Testing the Performance of Air Outlets and Air Inlets
13. ASTM Standard D610 – Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces
14. ASTM Standard D714 – Standard Test Method for Evaluating Degree of Blistering of Paints
15. ASTM Standard D1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
16. ASTM Standard D1654 – Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
17. ASTM Standard D4752 – Standard Practice for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub
18. ASTM Standard E84 – Standard Test Method for Surface Burning Characteristics of Building Materials
19. NFPA Standard 70A, Article 100 – National Electrical Code
20. NFPA Standard 90B – Standard for the Installation of Warm Air Heating and Air-Conditioning Systems

**1.04 Administrative Requirements**

A. 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.

B. 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:
	1. Provide data indicating configuration, general assembly, materials used in fabrication, rated capacities, and furnished specialties and accessories.
	2. Include drawings indicating size, profiles and dimensional requirements of the linear floor grilles that are based on the specific system indicated.
	3. Include catalog performance ratings that indicate air volume flow, initial pressure drops, sound performance, and throw, as tested in accordance with ASHRAE 70.
3. Shop Drawings: For each type of product indicated, include the following:

1. Equipment assemblies and indicated dimensions.

2. Required clearances

3. Method of field assembly

4. Revit models

1. Coordination Drawings:
	1. Include floor plans, and other details, drawn to scale, on which the following items are shown and coordinated based on input from installers:
	2. Floor or underfloor-mounted items including:
		* 1. Floor structure (floor tiles, concrete, etc.)
			2. Floor finishing (carpet, tile, etc.)
			3. Access panels
			4. Electrical components
			5. Plumbing
			6. Networking components
			7. Terminal Units and other HVAC components
2. Operation and Maintenance Data: Include manufacturer’s descriptive literature, operating instructions, maintenance schedules and repair data, and parts lists.

**1.06 Quality Assurance**

1. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum ten 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.
3. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100 by a testing agency acceptable to authorities having jurisdiction and marked for intended use.

**1.07 Warranty**

1. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
2. Provide 12 month manufacturer warranty from date of shipment for grilles and registers.

**PART 2 – PRODUCTS**

**2.01 General**

1. Basis of Design: Global IFS Industries, Inc.
2. Horizontal Displacement Diffuser (Global IFS Model HDD)]
3. Modular Floor Diffuser Accessories [Global IFS Models VBD, CB/LB, BD/LBD, MBD/LMBD, SMB-F, SMB -VC, SMB -HC]
4. General Product Information:
5. Furnish and install Global IFS modular floor diffusers of the sizes and capacities indicated on the drawings or outlet schedule.
6. Unit sizes shall be selected in accordance with ASHRAE guidelines and manufacturer’s literature.
7. Manufacturers shall demonstrate that they have successfully supplied and installed underfloor HVAC products, as well as the computer modeling thereof for a minimum of ten years.
8. Manufacturers must be pre-qualified to bid based on the completion of a minimum of [xx] jobs in similar climates.
9. Manufacturers shall provide a list of completed jobs and references.
10. Underfloor Air System Controls:
	1. Air Grilles and diffusers specified for underfloor service shall incorporate the following requirements:
	2. Damper construction shall include an integral flow-modulation damper and motor (air valve) that is specifically designed for low static pressure air distribution, and throw no higher than 4.5 feet under full load in the interior zone 1.5 feet from the wall surface to achieve a Ventilation Effectiveness of 1.2 or higher in accordance with ASHRAE 62.1.
	3. Air dampers shall not include fast acting actuators that require high life cycle ratings.
	4. Flow-modulation with constant plenum air temperature shall reduce air flow and throw heights in response to lower space demands. Flow-modulation technique shall be implemented to maximize stratification, leading to energy savings and increased thermal comfort.
	5. Modulation by timed duty cycle of fully open and closed periods shall not be acceptable. This type of modulation can greatly reduce stratification, removing potential energy savings. Timed duty cycle modulation also increases the possibility of creating stagnant zones and starving buoyancy driven flow. Any use of this type of modulation shall be modified in order to demonstrate stratification to the project team prior to being considered acceptable.
	6. Plenum Rated Cables: Color-coded plug-and-play plenum rated cables shall be used between devices.
	7. Terminal block type plugs shall not be acceptable.
	8. Plug-and-Play cables shall carry both the power and control signal to each device and connect to a single port on the device control board.
	9. Cable types shall be limited to no more than one type and connector per device to reduce complexity in wiring and future modifications.
	10. Cables shall be stranded wire to increase flexibility in the wires, to improve ease of installation, and reduce damage during installation.

**2.02** **Horizontal Displacement Floor Diffuser**

1. Description:
2. Furnish and install Global IFS model HDD horizontal displacement floor diffusers in the sizes, core style, configurations and capacities indicated on the plans and air outlet schedule.
3. Performance:
4. Air shall be delivered to the space at low noise levels and low velocities that result in low induction horizontal flow resulting in a stratified zone temperature distribution within the occupied zone without the use of nozzles.
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 55-2004.
	1. If %DR performance data is not available, the manufacturer shall then provide a software program that allows room comfort evaluation for specific operating conditions and diffuser locations to aid in performance assessment. If such a computer program is not available from the manufacturer, 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 spaces. These shall include no less than five 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.
7. Construction:
8. The diffuser face shall have a positive interlock with the mounting hardware to reduce the chance of accidental adjustment due to foot traffic.
9. The diffuser core shall create horizontal flow with narrow slots arranged in a star pattern, and a perforated section in the center to resist induction of room air. The diffuser shall be (**select one**):
	* + - 1. An eight inch diameter core constructed of (**select one**):
10. Fire-rated polymer with permeating color in [black] or [dusty grey], in compliance with UL2043.
11. Finished aluminum.
	* + - 1. A ten inch core shall be constructed of finished aluminum.
12. The diffuser shall comply with NFPA 90B and shall be able to withstand a maximum mechanical loading of:
13. [**Polymer**] 1250 pounds.
14. [**Aluminum**] 4500 pounds.
15. The assembly shall include a [black] or [gray] polycarbonate standard distributor basket with damper device. Refer to “Modular Floor Diffuser Accessories” section for basket details.
16. Mounting/Fastening:
	* + 1. The diffuser shall be installed with a ring press fit (RPF).
			2. The diffuser shall be installed with a Zip Clip® for tool-free fastening from the room side. The Zip Clip® shall use a ratcheting mechanism to tightly and evenly secure the gasketed mounting ring and the entire assembly to the floor.

**2.03 Modular Floor Diffuser Accessories**

1. Modular Floor Baskets [Models MBD, LMBD, BD, LBD, CB, LB, VBD/VBD-HP]
2. MBD Standard Basket with Face Adjustable Damper:
	1. Furnish and install Global IFS model MBD modular floor adjustable diffuser basket as indicated on the plans and air outlet schedule.
	2. The discharge air flow shall be controlled by the basket and shall be adjustable from the face of the diffuser.
	3. The minimum flow limit shall be adjustable from zero to fifty percent of maximum flow using a mechanical stop.
	4. The adjustable diffuser face shall have a positive interlock with the mounting ring to reduce the chance of accidental adjustment due to foot traffic.
	5. The basket shall be constructed out of black fire-rated polycarbonate in compliance with UL 94 and UL 2043, and shall provide air flow equalization across the diffuser face.
	6. The basket shall minimize sightlines through the diffuser.
	7. The basket shall be supplied in [eight inch] or [ten inch] diameter.
3. DBAS Short Basket with Face Adjustable Damper:
	1. Furnish and install Global IFS model MBD modular floor adjustable diffuser basket as indicated on the plans and air outlet schedule. The short basket shall have a maximum height of 2.75 inches.
	2. The discharge air flow shall be controlled by the basket and shall be adjustable from the face of the diffuser.
	3. The minimum flow limit shall be adjustable from zero to fifty percent of maximum flow using a mechanical stop.
	4. The adjustable diffuser face shall have a positive interlock with the mounting ring to reduce the chance of accidental adjustment due to foot traffic.
	5. The basket shall be constructed out of black fire-rated polycarbonate in compliance with UL 94 and UL 2043, and shall provide air flow equalization across the diffuser face.
	6. The basket shall minimize sightlines through the diffuser.
	7. The basket shall be supplied in eight inch diameter.
4. DB Standard Basket with Damper:
	1. Furnish and install Global IFS model BD modular floor diffuser basket as indicated on the plans and air outlet schedule.
	2. The discharge air flow shall be controlled by the basket.
	3. The minimum flow limit shall be adjustable from zero to fifty percent of maximum flow using a mechanical stop.
	4. The basket shall be constructed out of black fire-rated polycarbonate in compliance with UL 94 and UL 2043, and shall provide air flow equalization across the diffuser face.
	5. The basket shall minimize sightlines through the diffuser.
	6. The basket shall be supplied in [eight inch diameter] or [ten inch diameter].
5. DBS Short Basket with Damper:
	1. Furnish and install Global IFS model LBD short modular floor diffuser basket as indicated on the plans and air outlet schedule. The short basket shall have a maximum height of 2.75 inches.
	2. The discharge air flow shall be controlled by the basket.
	3. The minimum flow limit shall be adjustable from zero to fifty percent of maximum flow using a mechanical stop.
	4. The basket shall be constructed out of black fire-rated polycarbonate in compliance with UL 94 and UL 2043, and shall provide air flow equalization across the diffuser face.
	5. The basket shall minimize sightlines through the diffuser.
	6. The basket shall be supplied in eight inch diameter.
6. CB Standard Basket:
	1. Furnish and install Global IFS model CB modular floor diffuser basket as indicated on the plans and air outlet schedule.
	2. The basket shall be constructed out of black fire-rated polycarbonate in compliance with UL 94 and UL 2043, and shall provide air flow equalization across the diffuser face.
	3. The basket shall minimize sightlines through the diffuser.
	4. The basket shall be supplied in [eight inch diameter] or [ten inch diameter].
7. LB Short Basket:
	1. Furnish and install Global IFS model LB short modular floor diffuser basket as indicated on the plans and air outlet schedule. The short basket shall have a maximum height of 2.75 inches.
	2. The basket shall be constructed out of black fire-rated polycarbonate in compliance with UL 94 and UL 2043, and shall provide air flow equalization across the diffuser face.
	3. The basket shall minimize sightlines through the diffuser.
	4. The basket shall be supplied in eight inch diameter.
8. VBD/VBD-HP VAV Basket:
	1. Furnish and install Global IFS model [VBD] [VBD-HP (High Performance)] modular floor distributor basket with integral VAV damper.
	2. The VBD shall include two modular jacks for system connection and one 25 foot (7.6 meter) plenum rated modular plug-in control cable.
	3. The electric actuator shall be 24 VAC bidirectional, directly coupled to the damper screw.
	4. The damper shall move from a fully open position to a fully closed position in 90 seconds.
	5. The basket shall be equipped with low leakage gasket at the fully closed position.
	6. The actuator must be capable of operating in the stalled position without overheating or mechanical damage.
	7. The basket shall be constructed out of black fire-rated polycarbonate in compliance with UL 94 and UL 2043.
	8. The basket shall be supplied in [eight inch diameter] or [ten inch diameter]. (**DBV-HP**only available in eight inch diameter)
		* 1. Round Basket with Collar [Global IFS Model PDC]:
				1. The round basket with collar shall be available for eight inch diameter diffusers in ducted applications.
				2. The basket shall have a maximum height of 2.25 inches.
				3. The basket shall be supplied in eight inch diameter.
			2. Sheet Metal Boot [Global IFS Model SMB]:
				1. Furnish and install Global IFS model SMB sheet metal boot as indicated on the plans and air outlet schedule.
				2. The sheet metal boot shall be used in conjunction with [eight] and [ten] inch modular floor diffusers to facilitate supply connections and debris collection, and shall be supplied in the following configuration (**select one**):
			3. Sheet Metal Boot, Fan Sourced (SMB-F):
				1. The boot shall be constructed of 22 gauge galvanized steel with a [six] or [eight] inch inlet.
				2. The boot shall mount under a standard floor tile. An optional mounting flange can be supplied to blank off structural depressions which may exist on the bottom surface of the floor tile thereby ensuring proper sealing to the diffuser.
				3. (**Optional**) The modular floor boot shall be supplied with a manual cable adjustable duct damper.
				4. (**Optional**) The modular floor boot shall be internally lined with half inch acoustic insulation (**select one**):

Dual density fiberglass:

Fiber-free:

* + - 1. Sheet Metal Boot, Heating and Cooling Supply (SMB-HC):
				1. The sheet metal boot shall be constructed of 22 gauge galvanized steel with a [six] or [eight] inch heating air inlet and [six] or [eight] inch cooling air inlet, complete with control damper.
				2. The boot shall mount under a standard floor tile. An optional mounting flange can be supplied to blank off structural depressions which may exist on the bottom surface of the floor tile thereby ensuring proper sealing to the diffuser.
				3. The modular floor boot shall be supplied with a floating point actuator furnished with two modular jacks for system connections and one 25 foot plenum rated modular plug-in control cable.
				4. The electric actuator shall be 24 VAC bidirectional, directly coupled to the cooling air control damper shaft. The actuator must be capable of operating in the stalled position without overheating or mechanical damage. The supplied actuator shall have a fully adjustable hardware stop allowing field adjustment and balancing.
				5. A peripheral gasket shall be provided on the control damper.
				6. (**Optional**) The modular floor boot shall be supplied with a manual cable adjustable duct damper.
				7. (**Optional**) The modular floor boot shall be internally lined with acoustic insulation (**select one**):

Dual density fiberglass:

Fiber-free:

* + - 1. Sheet Metal Boot, VAV Cooling (SMB-VC):
				1. The sheet metal boot shall be constructed of 22 gauge galvanized steel with a [six] or [eight] inch cooling air inlet complete with control damper.
				2. The sheet metal boot shall mount under a standard floor tile. An optional mounting flange can be supplied to blank off structural depressions which may exist on the bottom surface of the floor tile thereby ensuring proper sealing to the diffuser.
				3. The sheet metal boot shall be supplied with a floating point actuator furnished with two modular jacks for system connections and one 25 foot plenum rated modular plug-in control cable.
				4. The electric actuator shall be 24 VAC bidirectional, directly coupled to the cooling air control damper shaft. The actuator must be capable of operating in the stalled position without overheating or mechanical damage. The supplied actuator shall have a fully adjustable hardware stop allowing field adjustment and balancing.
				5. A peripheral gasket shall be provided on the control damper.
				6. (**Optional**) The modular floor boot shall be internally lined with [dual density fiberglass] or [fiber-free] insulation.

**PART 3 – EXECUTION**

**3.01 Examination**

A. Verify that conditions are suitable for installation.

B. Verify that field measurements are as shown on the drawings.

## 3.02      Manufacturer’s Field Services

* + 1. The manufacturer shall provide the services of an underfloor air systems specialist. This engineer shall make at a minimum the following trips to the site with construction and design personnel.
			1. The first trip to the job shall occur right before the raised access floor is being installed. The Global IFS engineer will inspect and ensure proper installation of Global IFS products. While on site, the Global IFS engineer will also inspect the area near the Global IFS products for any obvious concerns with construction within the underfloor plenum in regards to the air tightness of the plenum. Any deficiencies found shall be brought to the general contractor's attention on site that day. Site observation report shall be made and emailed to the Engineer of Record for approval. If approved they shall forward the report to the construction team as appropriate. The Global IFS engineer will address any issues regarding the equipment supplied by Global IFS to help ensure a successful completion of the project. Global IFS will not be held liable for issues outside of the operation of the product supplied by Global IFS.
			2. The second trip to the job shall occur during the building commissioning process. The Global IFS engineer shall verify proper operation and installation of the Global IFS supplied equipment and assist to solve problems that may prevent project completion due to said equipment. Any deficiencies found shall be brought to the general contractor's attention on site that day. Site observation report shall be made and emailed to the Engineer of Record for approval. If approved they shall forward the report to the construction team as appropriate. The Global IFS engineer will address any issues regarding the goods supplied by Global IFS to help ensure a successful completion of the project. Global IFS will not be held liable for issues outside of the operation of the product supplied by Global IFS.

**3.03 Installation**

1. See drawings for the size(s) and locations of modular floor diffusers.
2. Install modular floor diffusers level and plumb. Maintain sufficient clearance for normal services, maintenance, or in accordance with construction drawings.
3. Complete installation and startup checks according to manufacturer’s instructions and perform the following:

1. Verify that inlet duct connections are as recommended by manufacturer to achieve proper performance.

2. Verify that any identification tags are visible.

3. Verify locations of thermostats, humidistats, and other exposed control sensors with drawings and room details before installation.

1. Connect to ductwork in accordance with Section 23 31 00.

**3.04 Adjusting**

1. Balance outlets according to manufacturer’s recommendations.
2. Verify that field measurements are as shown on the drawings.

**3.05 Field Quality Control**

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

**3.06 Cleaning**

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

**3.07 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.