F. Provide ceiling labels for all equipment located above drop or hard ceilings. The markers shall indicate the equipment symbol

A. The equipment and systems referenced in this section are to be commissioned per Section 23 08 00 - HVAC System

END OF SECTION

a. Lay-in Ceiling - Locate the label on the ceiling grid member closest to the equipment location. b. Hard Ceiling - Locate the label on the access panel servicing the unit or closest access point.

B. The contractor has specific responsibilities for scheduling, coordination, startup, test development, testing and documentation.

associated with the contract documents and the type of equipment - e.g.: fan coil, steam trap, etc.

1. Identify the primary ceiling panel for access to each fan coil unit.

Coordinate all commissioning activities with the Commissioning Authority.

3.02 COMMISSIONING

ITEMFURNISHED BY

SECTION 23 08 00 HVAC SYSTEMS COMMISSIONING REQUIREMENTS

Complete all phases of Work so functional plumbing, mechanical, and electrical systems can be started, tested, adjusted, and

Start of commissioning procedures before system completion does not relieve HVAC equipment installer from completing

5. Perform functional testing using written commissioning test procedures and checklists for each commissioned system, subsystem

END OF SECTION

SECTION 23 31 00

HVAC DUCTS AND CASINGS

2. Installation of damper actuators furnished by the mechanical contractor - Coordinate with the controls contractor and the contract

Provide galvanized sheet metal ductwork for supply and return air systems except as specified or shown on the drawings.

Provide minimum gauge and reinforcing in accordance with Chapter Sixteen, "Duct Construction" of the Chapter 19 of the

2012 ASHRAE "Systems and Equipment" Handbook and the appropriate chapters of the latest edition of the Oregon

A. Construct and assemble all supply, return, outside air and general exhaust duct systems in accordance with latest edition of

Cover ductwork openings during construction after delivery to the field prior to and after installation. Seal ends, protect from

moisture and running water, adequately support to keep level and at least four inches off the ground. Store in clean dry space or if stored

C. Cross brake and reinforce ductwork and plenums with structural steel members to prevent breathing or ballooning.

E. Provide acoustical lining where specified in Section 23 33 53, Duct Liners. All dimensions are inside net.

Construct and assemble all ductwork and duct systems in accordance with the latest edition of the "Low

D. All joints in the air distribution system shall be sealed airtight with Hardcast CCWI-181 or similar LEED^K Compliant sealant.

G. Provide Durodyne flexible connectors, on both sides of wall, in ductwork passing through building seismic joints.

H. Install the damper actuators furnished by the controls contractor - Coordinate with the controls contractor and the contract

Construction Standard" published by SMACNA, Chapter One "Duct Construction" of the 1988 ASHRAE Handbook and the appropriate

K. Support all flexible ductwork on two foot centers by a minimum one inch galvanized sheet metal strap running around the duct.

N. When suspending duct by wire from an overhead support, duct shall be level with minimum sagging and wire should be as nearly

B. The contractor has specific responsibilities for scheduling, coordination, startup, test development, testing and documentation.

A. The equipment and systems referenced in this section are to be commissioned per 23 08 00 - HVAC System Commissioning

END OF SECTION

the "HVAC Duct Construction Standards" published by SMACNA, Chapter Sixteen, "Duct Construction" of the Chapter 19 of

the 2012 ASHRAE "Systems and Equipment" Handbook and the appropriate chapters of the latest edition of the Oregon

A. Submittals shall include Shop Drawings of any proposed revisions to the ductwork as shown on the drawings.

4. Ensure that equipment and systems are installed and started in accordance with the Contract Documents and manufacturer's

1 PART 1 GENERAL

B. Related Sections:

3 PART 3 EXECUTION

3.01 WORK BY CONTRACTOR

requirements and recommendations.

1 PART 1 GENERAL

drawings for damper locations.

2 PART 2 PRODUCTS

2.02 MANUFACTURERS

3 PART 3 EXECUTION

drawings for damper locations.

vertical as possible.

3.02 COMMISSIONING

3.01 INSTALLATION

Mechanical Specialty Code.

Mechanical Specialty Code.

outdoors cover and protect from the elements

Round duct to be sheet metal spiral duct.

A. Thermaflex, Genflex. Thermaflex used for selection

F. Duct construction pressure classification (SMACNA):

+2 inches for all supply air ductwork.

chapters of the latest edition of the Uniform Mechanical Code.

Extend ducts to full length prior to hanging.

All joints in the air distribution system shall be sealed airtight.

Maximum length of flex duct must not be more than five feet.

Coordinate all commissioning activities with the Commissioning Authority.

-1 inch for all for return and relief air ductwork.

1.02 SUBMITTALS

2.01 DESCRIPTION

1.01 SUMMARY

and piece of equipment in accordance with Section 01 91 00.

A. Section Includes: Related sections, warranties, and HVAC system commissioning requirements.

1. Section 01 91 00, General Commissioning Requirements. 2. Section 22 08 00, Plumbing Systems Commissioning Requirements. Section 26 08 00, Electrical Systems Commissioning Requirements.

A. Manufacturer's Warranty: Commissioning, inspecting, and testing shall not modify terms or time periods of HVAC equipment, systems, and controls warranties including related equipment and systems, and adjacent work.

Refer to Section 01 91 00, General Commissioning Requirements.

mechanical systems in accordance with the Contract Documents and the construction schedule.

6. Provide corrections, adjustments, and retesting in accordance with Section 01 91 00.

1. Providing of all required sheet metal ductwork specified or shown on the drawings.

Joint seals to be Ventfabrics C-520 duct tape and "Panduit" straps or approved equal.

Not Used

 Data to show compliance with flame and smoke rating. Manufacturer's catalog or technical data showing performance, dimensions, materials of construction and recommended methods

Remove and install new insulation as required to accommodate piping modifications as noted on the contract drawings. All piping

SECTION 23 07 00

HVAC INSULATION AND LINING

1. Providing of all required insulation for piping, valves, equipment and ductwork.

1.03 QUALITY ASSURANCE A. Insulation materials and accessories such as adhesives, cement, etc. shall have composite fire and smoke hazard ratings, as tested by procedures indicated in NFPA 255 and U.L. 723, not to exceed a flame spread index of 25 and a smoke developed

index of 50. Products or their shipping cartons shall have identification of the flame spread and smoke developed index. B. No product containing the following is allowed to be installed on the project: Pentabrominated diphenyl ether CAS#32534-81-9 Octabrominated diphenyl ether CAS#32536-52-0 Decabrominated diphenyl ether CAS#1163-19-5

insulation removed for work under this contract is to be replaced.

A. Provide submittals in accordance with Section 23 00 00.

2 PART 2 PRODUCTS 2.01 MANUFACTURERS

1 PART 1 GENERAL

A. Work included:

B. Submittals shall include:

1.01 SUMMARY

1.02 SUBMITTALS

SECTION 23 05 93 TESTING, ADJUSTING AND BALANCING FOR HVAC

A. Pipe and Duct Insulation: Manville, Knauf, Owens-Corning, Certain-teed, or approved equal. Manville used as basis of

B. Elastomeric Insulation Products: Armacell or approved equal. A. Refrigerant Piping Insulation: Armacell Armaflex closed cell CFC-free elastomeric insulation or approved equal. External Duct Insulation: Manville Microlite XG faced formaldehyde free, fiberglass duct insulation with FSKL jacket.

Duct Lining: Manville Linacoustic RC made of glass fibers bonded with a thermosetting resin.

Minimum installed R-value: 1. General Service (within Building Envelope) - R = Minimum 5.

Unconditioned Spaces - R = Minimum 5. Outside Building / Outside Air - R = Minimum 8

3 PART 3 EXECUTION

A. Refrigerant Piping: Insulate split system air conditioning systems refrigerant piping with elastomeric insulation per manufacturer's installation instructions. Seal joints with standard product of insulation manufacturer formulated for that

1. General Requirements: Apply internal insulation in accordance with manufacturer's recommendations and SMACNA B. "Duct Liner Application Standard." Apply internal insulation to flat sheet metal with continuous coverage of adhesive. Use C. Flexible ductwork shall be insulated type G-KM with polymeric lining and polyolefin outer jacket vapor barrier. adhesive on all butt edges. Install weld pins and clips on internal insulation 15" on center and no more than 2" maximum D.

a. General rectangular supply air ducts - Internally lined. Supply. Return, outside, relief air ductwork / plenums in mechanical mezzanine - Internally lined.

Round concealed supply and return air ductwork - Externally insulated. Return air ducts - Externally insulated. Duct dimensions shown are net inside dimension.

4. Coat all raw duct liner edges within the ductwork. No uncoated fiberglass is allowed within the ductwork.

A. The equipment and systems referenced in this section are to be commissioned per Section 23 08 00 - HVAC System Commissioning Requirements. B. The contractor has specific responsibilities for scheduling, coordination, startup, test development, testing and documentation. Coordinate all commissioning activities with the Commissioning Authority.

END OF SECTION

GRILLES DIFFUSERS AND LOUVERS

SECTION 23 37 13

1.1 SUMMARY

A. Work included: Providing of all required grilles, diffusers and louvers specified or shown on the drawings. 1.2 RELATED WORK

A. Common Work Results for HVAC, Section 23 05 00. B. Metal Ducts, Section 23 31 13.

1.3 SUBMITTALS A. Provide submittals in accordance with Section 23 05 00.

B. Submittals shall include manufacturer's catalog or technical data showing performance, dimensions, materials of construction and

2.1 MANUFACTURERS

A. Grilles & Diffusers: Price, Krueger, Anemostat, Titus, J&J, Carnes or approved equal. Price used as a basis for selection. B. Louvers: Greenheck, Ruskin, American Warming, Carnes or approved equal. Greenheck used as basis of design.

size shown on the drawings. Diffuser to have modular core, steel construction, quick release perforated face panel and standard finish with Border 1 for flat surface mounting. B. Supply Air Diffuser - Lay-In T-bar Mount: Model SMCD louver face diffuser with individually adjustable modular cores and neck

A. Supply Diffuser - Ceiling Surface Mount: Model PDMC perforated face diffuser with individually adjustable modular cores and neck

size shown on the drawings. Diffuser to have modular core, steel construction and standard finish with Border 3P for flush mounting in standard 24"X24" lay-in T-bar ceiling. C. Return and Exhaust Grilles - Surface Mount: Model 10 grille with perforated face of neck size shown on the drawings with standard finish with Border F for flush mounting hard ceiling. D. Return and Exhaust Air Grilles - Lay-in T-Bar Mount: Model PDDR grille with perforated face of neck size shown on the drawings

with standard finish with Border 3 for flush mounting in standard 24"X24" lay-in T-bar ceiling. E. Sidewall Supply Grille: 1. Residential dwelling units: Titus S300FS direct spiral duct mounted and 300FS flat style supply air grille, double deflection, aluminum construction, clear anodize finish, countersunk screw holes, curved border, foam gasketing.

General building support and common spaces: Model 520 rectangular steel construction grille, double deflection with horizontal face bars, spaced at 3/4", 1-1/4" margins and standard finish. F. High Sidewall Return Air Grille: Model 530 rectangular steel construction grille, 45-degree blade setting on 3/4-inch centers, 1-1/4"

margins and standard finish. G. Low Sidewall (top of grille below 7 feet) Return Air Grille: Series 96 heavy-duty rectangular steel construction grille, 45-degree blade setting on 3/4-inch centers, 1-1/4" margins and standard finish

H. Provide opposed blade dampers (OBD) as noted on the drawings. Louvers: Greenheck ESK drainable extruded aluminum louver with stationary blades. Provide drainable head, flanged frame and birdscreen. Minimum 50% free area. Prime coat finish for field paint application. J. Dwelling Unit Return Air Grilles: Model 530FF rectangular steel construction filter grille, 45-degree blade setting on 3/4-inch

centers, 1-1/4" margins and standard finish. Provide residential filter to match grille sizes. PART 3 EXECUTION

3.1 INSTALLATION

A. Install grilles where shown on the drawings and in accordance with manufacturer's instructions B. Install dwelling unit sidewall supply air grilles in spiral ductwork (Style S300FS) and flat style (Style 300FS) in end plenums where noted on the drawings.

C. Install a gasket to assure an airtight seal between ductwork or ceiling and grille. Install all grilles tight to their respective mounting surfaces.

E. Install plumb and true with room dimensions and accurately centered on projections as shown on architectural reflected ceiling

Paint inside of ducts behind grilles flat black. G. Verify any special paint or color requirements with the Architect prior to ordering grilles.

END OF SECTION

REVISED

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MECHANICAL SPECIFICATIONS

Sheet Number

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