

SECTION 11244 - DIFFUSERS, COARSE BUBBLE, REMOVABLE

City of San Diego, CWP Guidelines

PART 1 -- GENERAL

1.1 WORK OF THIS SECTION

- A. The WORK of this Section includes providing removable coarse bubble diffuser system(s) for the aerated grit chamber(s) as indicated. All equipment shall be provided complete with all accessories, connections, supports, anchors, and controls necessary for a workable system. The coarse bubble system shall be defined as risers, valves, lifting lugs, fittings, connections, couplings, distribution headers, diffusers, supports and anchors, extending from the air header but excluding the air header itself, through the individual diffusers.
- B. The WORK also requires that one manufacturer be made responsible for furnishing the WORK of this Section but without altering or modifying the CONTRACTOR'S responsibilities under the Contract Documents.
- C. The WORK additionally requires that the one responsible manufacturer shall manufacture the principal elements and components including, as a minimum, the diffusers.

1.2 RELATED SECTIONS

- A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.
 - 1. Section 11000 Equipment General Provisions

1.3 SPECIFICATIONS AND STANDARDS

- A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:
 - 1. ASTM A182-81 Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service
 - 2. ASTM A240-81 Heat-Resisting Chromium and Chromium Nickel Stainless Steel Plate, Sheet, and Strip for Fusion-Welded Unfired Pressure Vessels
 - 3. ASTM A276-81 Stainless and Heat-Resisting Steel Bars and Shapes
 - 4. ASTM A312-81 Seamless and Welded Austenitic Stainless Steel Pipe
 - 5. ASTM A403-81 Wrought Austenitic Stainless Steel Pipe Fittings

1.4 SHOP DRAWINGS AND SAMPLES

- A. The following shall be submitted in compliance with Section 01300:

1. Manufacturer's specification data and literature indicating back pressure versus air flow through the diffusers.
2. Information on at least one installation of comparable size and complexity supplied by the manufacturer in the recent past with addresses and telephone numbers of contacts.

1.5 OWNER'S MANUAL

- A. The following shall be included in the OWNER'S MANUAL in compliance with Section 01300:
1. Operation and maintenance information.
 2. Certification that all materials comply with specification requirements.

1.6 SERVICES OF MANUFACTURER

- A. **Inspection, Startup, and Field Adjustment:** An authorized representative of the manufacturer shall visit the site for not less than [] day to furnish the indicated services.

1.7 QUALIFICATIONS

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NTS: In the paragraph below, define the terms "comparable size and complexity" for the equipment or system specified. Requiring experience of more than one successful project requires sound justification and prior written approval from the City Project Manager.

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- A. **Manufacturer:** Company which has supplied at least one system of comparable size and complexity in the United States in the recent past. Installations of comparable size and complexity shall have the following characteristics: [].

PART 2 -- PRODUCTS

2.1 GENERAL

- A. **General:** Air diffusion equipment, supports, and pipe plugs, bolts, washers, nuts and castings shall be made of Type 316 stainless steel. All items manufactured or attached by welding shall be of Type 316L stainless steel.

- B. **Operating Requirements:** Diffusion equipment shall be designed for the following conditions:

1. Air flow per diffuser - [4.0 to 8.0]
2. Number of diffusers - []
3. Maximum diffuser submergence, ft - []

- 4. Nominal air pressure, psig - []
- 5. Diffuser headloss, inches water column
 - At maximum flow - [8]
 - At minimum flow - [2.5]

C. **Environmental Conditions:** Air diffusion equipment shall be designed for submergence in municipal wastewater containing sand, gravel, bits of metal, and dilute concentration of petroleum products, industrial solvents, [20 to 30 parts per million of ferric chloride], [small amounts of aluminum sulfate], and detergents. Water temperature is expected to range from 55 to 85 degrees F.

2.2 AERATION AIR DIFFUSION ASSEMBLIES

A. **General:** Each aeration air diffusion assembly shall consist of air diffusers, air headers, and a removable hanger feed pipe. Assemblies shall be supported at intervals and spaced as indicated.

Each aeration air diffusion assembly shall be constructed to allow easy removal as a complete unit without drawing down the level of the liquid in the [tanks] [and] [channels].

Assemblies shall be designed for not more than a [15]-inch water column air pressure loss between the air main and the last air diffuser inlet when operating at an aeration air flow range of [8] scfm per diffuser.

B. **Distribution Headers:** Distribution headers shall be at least 3 inches in diameter, comprised of two sections of Type 316L stainless steel Schedule 40 pipe welded to flanges which attach to a cross fitting as indicated. Each section of pipe shall be approximately 10 feet long. The outer ends of each distribution header shall terminate in removable pipe caps.

Each distribution header section shall be equipped with 3/4-inch, double ended, tee shaped, forged Type 316L stainless steel bosses, welded on. Such bosses shall be accurately drilled and tapped for 3/4-inch pipe threads to receive diffuser tubes or pipe plugs, as indicated. All bosses on each header section shall be on a perfectly straight line and shall be drilled and tapped in a drilling fixture to provide level installation of diffusers. Bosses shall be attached to the bottom centerline of the header sections.

C. **Air Riser Pipes:** Each air riser pipe shall be at least 3 inches in diameter, comprised of one section of Type 316L stainless steel, Schedule 40 pipe, an elbow or tee, and flanges and mechanical pipe couplings as indicated. The upper elbow or tee shall include a lifting hook. Connections between the riser pipe and header shall be flanged. The hanger feed pipe shall serve as a support for the riser pipe.

D. **Diffusers:** Each diffuser shall consist of a balancing nozzle, an inverted air reservoir, air exit ports and a deflector. The balancing nozzle shall be fitted with a replaceable orifice designed to provide the performance characteristics indicated above. The air exit ports shall be located on horizontal planes on two levels to discharge air into the liquid. The deflector shall be located below the open bottom of the inverted air reservoir. The deflector shall direct the liquid being aerated along the inverted air reservoir's outer walls. Diffusers shall be designed to shear air into small bubbles as it is discharged and to prevent liquid from entering the air headers upon cessation of air flow. Each diffuser shall be provided with an integral hex nut and 3/4-inch threaded pipe connection for mating to the bosses attached to

the air headers. Diffuser spacing shall be as indicated. Type 316L, Schedule 40, stainless steel pipe nipples shall be used to offset alternate diffusers along the air headers, as indicated. Diffusers shall be fabricated of Type 316L stainless steel.

- E. **Lifting Lugs:** Individual aeration air assemblies and each field disassembleable part over 100 pounds in weight shall be provided with lifting lugs for easy handling.

2.3 NAMEPLATES, TOOLS, AND SPARE PARTS

- A. **Spare Parts:** [Five] diffusers shall be furnished, properly boxed and tagged in accordance with Section 11000.

2.4 MANUFACTURERS

- A. Diffusers shall be manufactured by one of the following (or equal):
 1. Sanitaire, [model D-12]
 2. Endurex, [model CCB-12]
 3. Pollution Control, [model SS]

PART 3 -- EXECUTION

3.1 INSTALLATION

- A. Aeration air diffusion equipment shall be installed as indicated and in conformance with the recommendations of the manufacturer. Particular care shall be taken to ensure that all diffusers are installed in a single horizontal plane within a tolerance of plus or minus 1/8-inch. A manufacturer's certificate of installation shall be provided.
- B. **Cleaning and Testing:** The CONTRACTOR shall carefully clean all piping, headers, and accessories through which air is delivered so that all dust, dirt, oil, grease, or other foreign material will be effectively removed. This cleaning shall be done with clean water and an acceptable solvent at a velocity of 2 to 3 feet per second. After the piping has been completely cleaned, it shall be thoroughly flushed with water. The installation of diffuser units shall not begin until the air distribution assembly has been cleaned and inspected.

After the piping, headers, and diffuser units have been installed, water shall be introduced into the structure until the diffuser units have been covered about 2 inches. Compressed air shall then be released through the diffuser units and any leaks and improperly aligned diffusers shall be repaired. This test shall be repeated until the entire system is airtight and properly aligned.

Final testing shall include operation of all of the assemblies with all of the grit tank structures full to the design operating depth with water. The CONTRACTOR shall balance the system and perform air flow and pressure testing with the system on line. Air meters and gauges, if installed in the piping system, may be used for air flow testing, otherwise they shall be installed for test purposes only and removed at the end of testing, at no additional cost to the OWNER. The CONTRACTOR shall submit a complete report to the CONSTRUCTION MANGER upon completion of the air assembly testing.

** END OF SECTION **