SECTION 15300

Diesel Engine Intake & Exhaust Piping Systems

PART 1 GENERAL

1.01 SCOPE OF WORK

1. The Contractor shall furnish all labor, materials, equipment and incidentals required to install and ready for operation the intake and exhaust piping system and silencers for five (5) Caterpillar E295 diesel engines as shown on the Contract Drawings and as specified herein. The silencers and exhaust piping as shown on the Drawings are based on items as manufactured by PowerTherm Maxim.
2. Contractor may use an equivalent manufactured silencer by another manufacturer provided it is submitted in accordance with Paragraph 1.02 and accepted for Owner approval as an equal silencer.

1.02 SUBMITTALS

A. Provide the following information to confirm compliance with the specification in addition to the submittal requirements specified in Section 01340.

1. Complete description of all materials including the material thickness of all components.

2. Installation drawings showing all details of construction, details required for installation, dimensions and support locations.

1.03 QUALITY ASSURANCE

A. Qualifications

1. Manufacturer Qualifications: Minimum 5-year experience manufacturing similar products. The factory built modular exhaust system shall be furnished by a vendor organization that assures design, installation, and services coordination.
2. The specification is based on the MR32 silencer as manufactured by PowerTherm Maxim.

1.04 SEQUENCING

1. Only one (1) diesel engine exhaust system will be allowed to be removed at a time thus putting the accompanied pump out of service. The Contractor shall have all material on site before taking engine out of service.

1.05 WARRANTY

1. The exhaust system shall be warranted against functional failure due to defects in material and manufacturer's workmanship for a period of fifteen (15) years from date of installation.

PART 2 EQUIPMENT

2.01 GENERAL

1. Diesel engine intake & exhaust piping and silencers shall be as specified herein and have the characteristics and dimensions shown on the Contract Drawings.
2. Finish: Engine exhaust components shall be coated with a high temperature silver paint as specified in Section 09990. Engine intake air cleaner housing to match existing Caterpillar engine color.

2.02 CRITICAL GRADE THIN LINE SILENCER

1. Silencer shall be an 18” model MR32 critical grade thin line silencer as manufactured by PowerTherm Maxim or Owner approved equal.
2. Minimum sound attenuation of 35 dBA.
3. Body of silencer shall be constructed of formed carbon steel with a minimum thickness of 0.134 inches.
4. Support brackets shall be provided on the bottom of the silencer to facilitate installation on a support stand. Mounting style shall be as shown on the Contract Drawings.
5. Orientation of inlet and outlet shall be Side In-Side Out (SISO).
6. Inlet and outlet flanges shall be ANSI drilled 125/150 lb.
   1. EXHAUST PIPING
7. Piping shall be constructed of 10-gauge carbon steel with a minimum thickness of 0.134 inches.
8. Flanges shall be ANSI drilled 125/150 lb.
   1. SINGLE PLY BELLOWS (EXPANSION JOINT)
9. Piping shall be constructed of carbon steel.
10. Bellows shall have fatigue cycle of 10,000.
11. Flanges shall be ANSI drilled 125/150 lb.
12. Bellows design shall be per Expansion Joint Manufacturers Association 9th Edition.
    1. REMOVABLE INSULATION COVERS - SPRING TYPE WRAP
13. Material Components: Inner Jacket is an 18 oz Vermiculite Coated Fiberglass Cloth (1,100 F). The Insulation Material is a 9 PCF Fiberglass mat (1100 F). The Fiberglass mat is encased by the Silicone coated Fiberglass (550 F) Outer Jacketing cloth and sewn together, producing encapsulated Cover system. The Removable Cover system includes fasteners (SS Quilting Anchors & SS Springs) for installation.
14. Design Maximum Temperature: The design maximum Cover design is service temperature will be 1100˚F.
15. Construction: Removable Cover will be sewn lock stitch with a minimum 7 stitches per inch. Raw cut jacket edge should not be exposed. The stitching will be done with SS thread (1100 F).
16. Material Cover Overlap: In minimizing heat loss from fittings, the Removable Cover will extend beyond mating flanges unto existing insulation for a minimum of 2”. Where blanket cannot fit over existing oversized insulation, blanket will butt up to existing insulation with a friction fit closing seam. All sections of pipes will be insulated, and open gaps are not acceptable. Removable Cover diameters which are 2” or larger than existing insulation must be end capped to eliminate open air void.
17. Identification Name Plate: For easy identification, an aluminum or 304 type stainless steel nameplate tag will be riveted to each Removable Cover piece. 1/8” embossed lettering will show location; item date of manufacturer, work order number, location, description, size, pressure rating and tag/item number sequence. Each blanket will require an I.D. Plate.
18. Removable Cover Insulation Weight Limits: on large equipment design, the removable covers, where many pieces will be necessary, the number of pieces will reduce to as few as possible. No individual piece will be more than 40 lbs. each.
19. Quilting Pins: Removable Cover quality and thickness shall be 14-gauge quilting pins. They will be placed at various locations not more than 18 inches apart. This shall accomplish and prevent the shifting of the insulation. 14-gauge speed washers to secure the quilting pin stem in place.
20. Minimized Air Void - Equipment and equipment heads are typically a multi-piece design and are installed in tag number sequence. Heat exchanger heads, large vessel flanges and pump housings will be designed in two half sections. Removable Cover design will conform to the equipment with minimized air void. All valve covers will be a two-piece design with a separate body and bonnet.
21. Closure and Cover Attachments: Removable Cover attachments will be using SS Quilting Anchors & SS Spring/loop system for proper closure of Covers.
22. Installation Instruction Drawings – A Cover that has more than three (3) pieces is to include Assembly Drawings identifying each piece location and Bill of Material of all pieces and Instructions for Installation on how it will be installed. CAD files & project records will be kept by the manufacturer when re-ordering and individual parts for replacement.
    1. INTAKE AIR CLEANER HOUSING
23. Contractor shall supply a two-element horizontal intake air cleaner housing for each of the five (5) engines as manufactured by Caterpillar (Model No. 132-9327) or Owner approved equal. Housing shall be capable of accepting stock Caterpillar air cleaner filters. Contractor shall provide two (2) Primary Standard Efficiency Engine Air Filter filters (Model No. 105-9741) per housing.

PART 3 EXECUTION

3.01 INSTALLATION

* + 1. The exhaust system shall be installed as designed by the manufacturer and in accordance with the terms of the manufacturer’s warranty and in conjunction with sound engineering practices.
    2. The exhaust system shall be installed according to the manufacturer’s installation instructions and shall conform to all applicable state and local codes.
    3. An appropriate heat resistant gasket such a PowerTherm Maxim M-47-FF-1800 full face gasket or Owner approved equal shall be used at all flanged connections to form a proper seal.
    4. Horizontal runs of exhaust piping shall slope downwards, away from the engine, towards the condensate trap.
    5. Provide all supports, guides, piping, bellows type expansion joints, gaskets, drains, flashings, storm collars as required to provide a complete system.
    6. The entire exhaust system from the engine discharge to the termination point, including all accessories, except as noted, shall be from one manufacturer.
    7. This exhaust system shall be installed to be gas tight to prevent leakage of combustion products into a building.
    8. The double element intake air cleaner housing shall be mounted on a supporting structure as shown in the location on the Drawings.
    9. All new exhaust piping on the interior of the building shall be wrapped with one inch thick removable cover insulation blankets.
    10. The Contractor shall provide all necessary piping and fittings necessary to connect the new air intake housing to the engine.
    11. The procedures and practices of API RP 686 2ND ED (2009): Recommended Practice for Machinery Installation and Installation Design; Second Edition shall be adhered to should any adjustments be necessary that require movement of the diesel engines.

3.02 FIELD TESTING

1. After installation but prior to covering with removable insulation covers, all exhaust systems shall be field tested in the presence of the ENGINEER and OWNER to ensure that all items of equipment are in full compliance with this Section.

* END SECTION -