SECTION 23 09 23

DIESEL GENERATOR FUEL CONDITIONING AND DELIVERY SYSTEM
PROPRIETARY / APPROVED-EQUAL SPECIFICATION

Basis of Design:
Steady State Fuel Systems, LLC
Model **SSFTR-SFR-D5-L-CPU**
Duplex 5 GPM Fuel Conditioning and Delivery System

PART 1 – GENERAL

1.1 SUMMARY

Provide a factory-assembled, skid-mounted diesel fuel conditioning and delivery system for emergency and standby diesel generators. System shall provide continuous fuel circulation, filtration, thermal management, monitoring, and alarm annunciation during generator runtime and non-runtime fuel polishing cycles.
System shall be designed to operate concurrently with generator operation without interruption of generator fuel supply.

1.2 BASIS OF DESIGN

The basis of design system is manufactured by **Steady State Fuel Systems, LLC**, Model **SSFTR-SFR-D5-L-CPU**, or approved equal.
Substitution requests shall be submitted to the Engineer of Record a minimum of fourteen (14) days prior to bid and shall demonstrate full compliance with all specified performance, redundancy, filtration, control, monitoring, and operational requirements. Systems requiring omission of features, reduced redundancy, or modification to achieve compliance shall not be considered equal.

1.3 REFERENCES

- NFPA 110 – Standard for Emergency and Standby Power Systems
- UL 508A – Industrial Control Panels
- ISO 4406 – Fluid Cleanliness Codes
- Applicable local codes and authorities having jurisdiction

1.4 SUBMITTALS

- Product data sheets
- System schematic and piping diagrams
- Control panel wiring diagrams
- Sequence of operation
- Compliance matrix indicating conformance with each specification requirement
- Installation, Operation, and Maintenance (IOM) manual

1.5 QUALITY ASSURANCE

Fuel conditioning system shall be factory assembled and tested prior to shipment. Control panel shall be UL-508A listed and labeled.

1.6 WARRANTY

Manufacturer's standard warranty. Damage resulting from improper installation, closed-loop piping arrangements, obstructed fuel return paths, or thermal expansion conditions shall not be considered a manufacturing defect.

PART 2 – PRODUCTS

2.1 GENERAL SYSTEM REQUIREMENTS

- Skid-mounted, factory-assembled system
- Designed for diesel fuel service
- Capable of continuous operation during generator runtime
- Capable of off-cycle fuel polishing when generator is not operating
- No interruption of generator fuel supply during maintenance activities

2.2 PUMP ASSEMBLY

- Duplex stainless steel rotary vane pumps
- Each pump rated **5 GPM minimum**
- Carbon graphite vanes
- Mechanical seals
- Positive displacement design with adjustable internal pressure relief
- Pumps arranged in automatic lead/lag configuration
- Automatic alternation to equalize run time
- Automatic switchover upon pump fault or failure

2.3 MOTORS

- 3/4 HP minimum
- Continuous duty
- 1745 RPM
- Single-phase 115/208-240 VAC, 60 Hz
- TEFC enclosure
- NEMA 56C frame
- Minimum service factor 1.15

2.4 FILTRATION ASSEMBLY

System shall include a two-stage, high-efficiency filtration assembly consisting of:

Particulate Filtration

- Spin-on particulate filter
- Efficiency: **4 micron @ Beta 2000**
- Target fuel cleanliness: **ISO 14/13/11 or better**
- Incorporates electrostatic reduction technology
- Clean filter pressure drop ≤ 1 psi @ 10 GPM

Water Absorption Filtration

- High-capacity water-absorbing media
- Spin-on configuration

Filter Head Requirements

- Integral 25 psid bypass valve
- Visible differential pressure indicator (Green / Yellow / Red)
- Electric differential pressure switch installed in each filter head
- DP switch actuation at **20 psid**
- Filter isolation and bypass valving to permit filter replacement while system is operating

Hydraulic or automotive-style filters are not acceptable.

2.5 HEAT EXCHANGER

- Integral stainless steel plate-type heat exchanger
- Cross-flow configuration
- Minimum 32-plate construction
- Designed to reduce generator return fuel temperature prior to recirculation
- Rated to cool generator return fuel from up to 150°F to approximately 100°F at maximum design conditions

2.6 DAYTANK / RESERVOIR

- Integral fuel reservoir, nominal 14-gallon capacity
- Bolted removable lid with Buna gasket
- Mechanically actuated float assembly
- Stainless steel spring-loaded check valve
- Flow restriction to control inlet rate
- Spring-loaded bypass valve set at approximately 10 psi
- Integral rupture basin with leak detection switch

2.7 CONTROLS

System shall include a PLC-based control panel with the following features:

- UL-508A listed industrial control panel
- NEMA 3R non-metallic enclosure
- Lockable, panel-mounted disconnect switch
- Integral motor starters with thermal overload protection
- Automatic pump sequencing and redundancy management
- Continuous fuel level monitoring with programmable alarm setpoints:
    - Critical Low
    - Low
    - High
    - Critical High
- Filter differential pressure monitoring
- Leak detection monitoring
- System flow confirmation
- Generator run status input
- Local **7-inch color touchscreen HMI**
- Communications capability via **BACnet or Modbus (RS-485 or TCP/IP)**

2.8 INSTRUMENTATION

- Continuous level sensor, 4-20 mA output
- Adjustable flow switch, normally open
- Leak detection switches in skid and rupture basin
- Pump motor overload monitoring
- Optional fuel temperature sensor

All control inputs shall operate on 24 VDC supplied by the control panel.

PART 3 – EXECUTION

3.1 INSTALLATION

- Install system in accordance with manufacturer's recommendations
- Skid shall be installed level and accessible for service
- Fuel supply piping shall be routed to promote full circulation of the main fuel storage tank
- Fuel return piping shall be routed to a separate location within the tank to minimize stratification

3.2 PIPING REQUIREMENTS

- Maximum suction lift shall not exceed 15 feet
- Minimum piping sizes:
  - Supply from main tank to system: **1 inch**
  - Return to main tank: **3/4 inch**
  - Generator supply and return: **3/4 inch** (may be reduced as required)
- Friction loss and head pressure shall be considered by installer

3.3 THERMAL EXPANSION PROTECTION

System does not include thermal expansion volume. Fuel return piping shall always remain unobstructed to allow pressure relief back to the main fuel tank.
Closed-loop piping arrangements are prohibited.

END OF SECTION