1.0 GENERAL

A. This Specification, together, the Requisition/Inquiry Package and other referenced attachments define the minimum requirements to be satisfied by the Vendor in the design and fabrication of metering gear pumps and applicable accessories. The attachments identified in this document are considered part of these specifications.

2.0 CODES AND STANDARDS

A. The codes and standards in this specification represent the minimum requirements that must be adhered to. Regional and Local codes and testing requirements that are more stringent than those identified herein that are applicable shall be identified by the bidder and included in his proposal.

B. Where a specific edition date is not indicated, it shall be taken that the most current edition (including addenda) in effect at the time of the Vendor's proposal submittal shall apply.

1. ANSI - American National Standards Institute.
2. ASTM - American Society for Testing and Materials.
3. NEC - National Electrical Code.
4. NEMA - National Electrical Manufacturers Association.
5. OSHA - Occupational Safety and Health Administration.

3.0 SCOPE OF SUPPLY

A. The Vendor shall furnish the design, submittal data, fabrication, assembly, surface preparation and painting, inspection, testing, packing and shipping of the pump(s) as specified herein including:

1. Pump
2. Motor
3. Pump Controller
4. Other items as specified herein.

4.0 CHEMICAL FEED PUMP

A. DESCRIPTION

1. Pump shall be case driven type consisting of a pump, motor and integrated digital user interface for pump and motor control, together with integrated I/O connections for interface with customer SCADA or DCS (Distributed Control System) systems, all combined in a single unit. Entire assembly shall be certified for

    a. NEMA 4X / IP 66 Locations

    b. NSF 61

    c. CSA/UL or cETLus

    d. RoHS Compliant

    e. Available with BABAA compliant configurations

B. PUMP CONTROLLER

1. Pump shall have digital user interface that provides capabilities as outlined below:

    a. 7-inch touch screen interface that does not require the use of a separate stylus tool

    b. Select and program modes of operation

    c. Define, calibrate and set alarms and notifications for I/O analog and digital signals

    d. Monitor pump performance and observe predicted service intervals and self-diagnostics

    e. Access and download operation data

    f. Easily observe if pump is operating normally, if maintenance or immediate attention is required.

    g. Clearly labeled on/off button in a highly visible red color for quick recognition.

2. Inputs and Outputs for communication, control and monitoring

    a. Analog and/or frequency inputs to for flow and pressure to interface with digital user interface

b. Analog and/or frequency inputs to receive flow or speed signals from DCS

c. Programmable digital dry contact input from DCS

d. Programmable analog output and MODBUS interface

e. Programmable Form C, relay outputs for RUN, AUTO/MANUAL, READY, START/STOP

f. USB for software updates and download of logged data

g. Ethernet TCP/IP

h. Bluetooth and Wi-Fi

3. Turndown: Pump flow adjustment shall be accomplished by varying pump motor speed for laminar flow delivery. For low flows, pump will use cycle through periods of varying speeds providing pulsating flow. Entire pump turndown is 0-100% of the maximum rated flow at the achievable at the specified operating pressure.

4. Accuracy. Flow accuracy is dependent on the steady state accuracy of the flow measurement device employed.

5. The controller shall have the ability to employ all of the following control plans:

   a. Flow pacing: pump operates to a manual, remote or automatic required flow setting

   b. Speed pacing: pump changes speed in response to manual, remote or automatic speed setting

   c. Batching and Timer based flow modes

6. Separate control panels and variable frequency drives (VFDs) shall not be acceptable.

C. PUMP CONSTRUCTION

1. Pump shall be of the external spur gear type design wherein a fresh supply of liquid is transferred from the suction side of the pump to discharge side of the pump via the rotation of two identically sized gears (drive and idler) rotating in opposite directions, carrying liquid in the spaces between the gear teeth and the pump housing.

Diaphragm type, progressive cavity and peristaltic pumps shall not be acceptable.

2. Pump shall be capable of producing a constant, linear and pulsation-free flow over a range of 0-100% of the pump's capacity.

3. Pump quantities and performance requirements are provided in 5.0 Conditions of Operation.

4. Pump shall be capable of withstanding a temporary upset condition in which the pump is left to run dry for up to 15 seconds without sustaining any damage to pump internals. Pumps shall automatically shut down within 10 seconds when low or no flow is detected.

5. All surfaces that come into direct contact with the fluid being pumped must be either PVDF, carbon-reinforced PTFE, alumina ceramic, PEEK, graphite impregnated silicon carbide, carbon, EPDM or Viton. Pumps incorporating metallic wetted components for proper operation will not be acceptable.

6. All pump housings are to be constructed of PVDF. Metallic pumps employing non-metallic linings or coatings on wetted surfaces shall not be acceptable.

7. The gear set (driver and idler) must be non-metallic. Non-metallic gear material shall be carbon reinforced PTFE or PEEK. All gear materials shall be non-sparking for use with hazardous fluids. The gears shall be molded integral to the associated shaft. Gear mounting hardware such as retaining rings or gear keys is not acceptable.

8. Shafts shall be made of alumina ceramic material or PEEK. Metallic shafts are not acceptable.

9. Pump design must include a removable housing liner made from carbon reinforced PTFE. This part, whose function is to absorb normal housing wear, must be offered as part of a standard maintenance kit to allow renewable pump hydraulic performance. Pump designs not incorporating a removable housing liner shall not be accepted.

10. Pump bearings are to be of the internal sleeve type design and shall include spiral grooves so that they are properly cooled and lubricated by the pumped fluid. Pumps relying in external bearing lubrication systems shall not be acceptable.

11. Bearings and wear plates shall be of the one-piece integral design. Separate bearings and wear plates are not acceptable.

12. Pump shall be magnetically driven. Pumps utilizing packing or mechanical seals shall not be acceptable

13. Driven and drive magnets shall be made from rare earth Neodymium Iron suitable for temperatures up to 300 F without degradation of magnetic strength. Other materials such as ceramics or rare earth Samarium Cobalt are not acceptable.

14. Driven magnet assemblies shall be fully encapsulated. Design must include spline drive geometry to allow for ease of alignment and assembly. Mechanical locking of the driven magnet to the drive shaft by any other means is not acceptable.

15. Drive magnet assemblies must be zinc or nickel plated on all exterior surfaces to minimize atmospheric corrosion. Drive magnet carrier must include a removable motor mounting hub for use with multiple motor frame sizes. Integral (one piece) drive magnet carriers and hubs are not acceptable.

16. Pump “containment-can” which seals the pump and provides a barrier between the exterior drive-magnet and the internal driven-magnet, which is completely exposed to the chemical being is to be constructed of PVDF material. Any metallic components, linings and/or outer shell reinforcements are not acceptable. “Containment-can” must be sealed from the environment by use of an elastomeric O-ring. Gaskets or other sealing devices are not acceptable.

17. Pump housings must be designed to be sealed by a maximum of two (2) static sealing elastomeric O-rings.

18. Pump design must include a single, non-sealing elastomeric O-ring, as a means of tolerating varying internal clearances as the result of normal wear or thermal expansion. The use of leaf springs, wavy washers or other tolerance accumulators are not acceptable.

19. NPSH required for pump operating conditions shall not exceed 2 feet.

20. Pumps shall be capable of suction lift to 5 ft after prime and with the use of suction line foot valve or check valve.

21. Open loop flow repeatability shall be within plus or minus 5%.

22. All external hardware shall be 300 series stainless steel.

23. Pump shall be built with hex-nut receptacles integral to the pump housing to allow for assembly and disassembly with a single wrench.

24. All typically wearing parts of the pump shall be replaceable without disturbing the process piping.

25. Pump assembly shall allow for foot mounting or wall mounting with and optional manufacturer provided bracket. Wall bracket shall be structurally adequate to prevent misalignment or vibration.

26. All pump casings connections shall be American Standard Taper Pipe Threads.

27. Pump shall be supplied with laminar flow, paddle wheel type flow meter for interface with on board pump controller.

28. The pumps shall be Eclipse Pro® series as manufactured by Pulsafeeder, Inc. a unit of IDEX Corporation.

D. MOTORS

1. Integrated motor shall be of the brushless DC variable speed type and suitable for the entire published performance range of the pump.

2. Motor shall be contained within a single pump, motor and controller housing.

3. Motor power supply and control shall be provided through the integrated motor controller.

5.0 CONDITIONS OF OPERATION

A. Pumps shall be designed for the conditions of service tabulated as follows:

Condition	Description
Service:	
Chemical:	
Viscosity:	
Manufacturer/Model:	
Number of Pumps:	
Capacity-Minimum (gpm):	
Capacity-Minimum (gpm):	

Condition	Description
Differential Pressure (psi):	
Max System Pressure (psi):	
Motor Type:	Brushless DC
Motor Power (HP):	0.33 hp
Power Supply:	115/230VAC, 50/60Hz, 1PH
Suction Port Size:	¼ inch NPT
Discharge Port Size:	¼ inch NPT

6.0 INSPECTION AND TESTING

A. The pump casing and cover shall be hydrostatically tested with cold water at 1.5 times the design pressure, in accordance with ANSI Specification B73.1 and Hydraulic Institute standards.

B. All pumps shall be 100% performance tested at maximum rated speed and pressure.

7.0 SHIPPING

A. As much as practical, equipment shall be shipped completely assembled to minimize field assembly and installation time. If equipment is shipped unassembled, all equipment, subassemblies and components shall be palletized or crated to prevent damage during shipment, unloading, and temporary storage.

B. Fluids used for hydrostatic testing and cleaning shall be drained prior to shipment.

C. All threaded openings shall be protected with plastic plugs.

D. Flanged openings shall be provided with non-metallic flange protection.

8.0 EQUIPMENT IDENTIFICATION

A. The equipment components shall have a corrosive resistant nameplate conspicuously displayed, permanently inscribed with the following information:

1. Manufacturer’s Name
2. Manufacturer’s Model Number
3. Manufacturer’s Serial Number

4. Equipment Name (When specified)

B. QR code on the pump and in the digital user interface shall provide link to comprehensive pump information and service tools.

9.0 SUBMITTALS

A. Vendor shall submit copies of all technical documentation required to establish compliance with this Section. Submittals shall include at least the following:

1. Manufacturer's certified rating data.

2. Certified shop drawings showing all important details of construction; dimensions and anchor bolt locations.

3. Descriptive literature, bulletins or catalogs of the equipment.

4. Data on the characteristics and performance of the gear pump(s). Data shall include guaranteed performance curves, based on actual shop tests of similar units, which show that they meet the specified requirements for head, capacity, and brake horsepower. Curves shall be submitted on 8-1/2" X 11" sheets, as large a scale as is practical. Catalog sheets showing a family of curves will not be acceptable.

5. Complete wiring diagrams and suitable outline drawings showing such details as are necessary to locate and complete field wiring.

6. The total weight of the equipment.

7. A complete total Bill of Materials.

8. Manufacturer's recommended spare parts shall be supplied in a Kit form, along with the manufacturer's current price for said kits. Various versions of spare parts kits shall be available.

9. Complete data on motors.

10. Sound level data.

11. In the event that it is impossible to conform with certain details of this Section due to different manufacturing techniques, describe completely all non-conforming aspects.

B. All required drawings shall be in both US and metric standard units.

C. Complete installation, operation and maintenance instructions shall be furnished for all equipment specified in this Section. The maintenance instructions shall include troubleshooting data and full preventative maintenance schedules and complete spare parts lists with ordering information.

10.0 END OF SECTION