SCOPE: This specification covers a portable, ultrasonic Doppler-type flow meter as manufactured by Pulsar Measurement, Malvern, UK / Largo, FL / Long Sault, Ontario. This instrument shall provide for non-intrusive flow measurement, indication, totalizing, transmitting and data logging of the flow rate in a full pipe.

1. GENERAL

1.1 Measure forward and reverse flow ± 0.1 to 40 ft/sec (± 0.03 to 12.2 m/sec).

1.2 Have an accuracy of ±2% of full scale on most wastewater applications. Have linearity of ±0.5% and repeatability of ±0.25%.

1.3 Operate on liquids with entrained particles or gases of 100 microns or larger and minimum concentrations of 75 ppm.

1.4 Operate from the outside of common pipe materials including: carbon steel, stainless steel, ductile iron, copper, PVC, FRP, ABS and other selected engineering materials.

1.5 Operate on AC/DC power.

2. TRANSDUCERS (SENSORS)

2.1 Have a single-head, clamp-on transducer with twin piezoelectric ceramic transmit and receive crystals encapsulated in epoxy resin and a stainless steel housing.

2.2 The transducer shall be solid state and transformer isolated, and operate at 640KHz.

2.3 The transducer shall be waterproof and operate at temperatures from -40°F to 300°F (-40°C to 150°C), and withstand accidental submersion to 10 psi.

2.4 The transducer shall be designed to install on pipes with inside diameter ranging from 1/2" to 180" (12.5 mm to 4.5 m).

2.5 Have a 12 ft (3.6 m) long flexible, shielded coaxial pair cable extending from the transducer to the electronics.

2.6 Shall include Manufacturer's recommended sensor coupling compound and adjustable stainless steel sensor mounting clamp.

3. ELECTRONICS

3.1 Have a portable ABS electronics enclosure with a padded, watertight IP67 carrying case. Total weight shall be less than 14 lbs (6.5 kg).

3.2 Electronics shall be designed for continuous operation at temperatures from -10° to 140°F (-23° to 60°C).

3.3 Have a built-in 5-key calibration keypad with operator selection of parameters through visual prompts from a menu calibration system. Systems requiring calibration by Parameter codes or external calibrators shall not be accepted.

3.4 Have user-selectable menu languages including English, French and Spanish.

3.5 Have a white, backlit matrix display indicating flow in user-selected engineering units, totalized flow, units of calibration, and signal strength.

3.6 Have display backlight brightness adjustment for reduced power consumption.

3.7 Have flow proportional 4-20mA output rated to maximum resistive load of 500 ohms.

3.8 Have a built-in 300,000 point data logger, USB output and connecting cables. Data logger shall support time and date-stamped logging and generate formatted flow reports including total, average, minimum, maximum and times of occurrence.

3.9 Include Windows software for data log retrieval, graphing and export.

3.10 Have automatic signal strength and signal confidence monitoring.

3.11 Have keypad adjustable signal cutoff to reduce interference.

3.12 Shall include an external charger with 100-240VAC 50/60Hz input.

3.13 Shall include an internal NiMH rechargeable battery with minimum capacity for 18 hours continuous battery operation.

3.14 Have a battery status indicator with automatic low battery shut off and battery overcharge protection.

3.15 Have user-selectable "sleep mode" synchronized to data logger sample rate for reduced battery power consumption.

4. OPTIONAL FEATURES FOR INSERTION IN SPECIFICATION AS REQUIRED:

4.1 Include additional 150 g. manufacturer's recommended ultrasonic sensor coupling compound.

4.2 Include 50 ft (15 m) length Sensor Cable extension complete with connecting plugs.

5. MANUFACTURER The instrument shall be a Model Greyline PDFM 5.1 Portable Doppler Flow Meter as manufactured by Pulsar Measurement, and warranted against defects in materials and workmanship for two years.