SECTION 15180 - ULTRASONIC DENSITY METERS

City of San Diego, CWP Guidelines

PART 1 -- GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing pipe-mounted density meters and remote mounted transmitters, complete with mounting brackets, cables, junction boxes, and accessories, to measure the density of sludge in sewage treatment plants.

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 15150 Meters, General

PART 2 -- PRODUCTS

2.1 GENERAL

A. **Operating Principle:** The density meter shall consist of a pair of ultrasonic transducers and an electronic control unit. The control unit shall generate an electrical signal which is converted to an ultrasonic signal at the transducer. The signal is directed across the pipe through the sludge where it is converted by the other transducer to an electrical signal in proportion to the sludge density. The received signal shall be amplified in the control unit and used to actuate a relay. The attenuation of sonic energy transmitted through a liquid shall be in proportion to the amount of entrained solids.

B. **Sensor**: The sensor shall consist of a vitreous or enamel-lined carbon steel pipe section, with ANSI B 16.5, class 150, raised face flanged ends, a valved flush connection, and externally mounted, removable ultrasonic transducers.

C. **Transmitter**: A separate, wall-mounted indicating transmitter shall be provided in a NEMA [4] enclosure. The transmitter shall include an indicator graduated in percent density, a power switch, and a calibration control. The chassis shall contain a clearly-marked gain adjustment for density, with a range over which the gain adjustment is usable. Where four-wire transmitters are permitted, they shall be provided with a loop powered signal current isolator.

D. **Cable**: The process pipe mounted detector and the indicating transmitter shall be inter-connected by a multiconductor cable in a flexible conduit.

E. **Schedule**: The density meters shall comply with the following:

I.D. No.	Location and Service	Pipe Size (inches)	Density Range
[ ]	[ ]	[ ]	[ ]

[ ] [ ] [ ] [ ]

2.2 DESIGN AND MATERIALS

A. **Characteristics**: The density meters shall conform to the following design characteristics:

1.	Power supply	- 120 volts, AC, 60 Hertz
2.	Output signal	- 4 to 20 milliamperes into 0 to 600 ohms galvanically isolated
3.	Measurement type	- ultrasonic
4.	Density range	- one to 5 percent solids
5.	Repeatability	- within 0.5 percent solids
6.	Response time	- 10 seconds
7.	Meter body	- Schedule 40 steel pipe, glass or vitreous-enamel-lined
8.	For outdoor location, only	- Analyzer to have surge protection
9.	For hazardous location, only	- 2-wire transmitter to be intrinsically safe with active intrinsic safety barrier

B. **Indicator**: Output indicators shall be provided with all analyzers. If the analyzer does not include an integral indicator, a 1-1/2-inch, 90 degree movement milliammeter enclosed in a NEMA 7 or 9 meter case shall be attached to the unit. Output indicators shall be calibrated in percent solids units and provided with tic marks at 8, 12, and 16 milliamperes. Milliammeter shall connect into the transmission circuit by means of banana jacks, and a permanently connected diode shall be provided to bypass the jacks if the meter is removed.

2.3 MANUFACTURERS

A. Density meters indicated shall be manufactured by one of the following (or equal):

1. Sensall, Inc., model 4940

PART 3 -- EXECUTION

3.1 INSTALLATION

A. **General**: Density meters and equipment shall be installed in accordance with the manufacturer's written instructions.

B. **Mounting**: The density meters shall be mounted in piping sections such that the fluid under measurement is flowing vertically in an upward direction.

** END OF SECTION **