

**WATER SUPPLIES DEPARTMENT**  
**STANDARD SPECIFICATION E-83-04**  
**OPEN CHANNEL ULTRASONIC FLOWMETER**

1. GENERAL

This specification outlines the technical requirements of an open channel ultrasonic flowmeter that operates on the principle of measuring the height or head of liquid as it passes over an obstruction in the open channel (a flume or weir) by measuring the transit time from transmission of an ultrasonic pulse to receipt of an echo. The construction and technical details of the open channel is not covered in this specification.

The design, operation and calibration of the open channel ultrasonic flow measuring equipment shall comply with the latest version of relevant IEC Standards as listed below or other international standards currently enforced on the date of tender invitation where applicable:

IEC 61685                      Ultrasonics – Flow measurement systems – Flow test object

IEC 60529                      Degrees of Protection Provided by Enclosures (IP Code)

Preferably the ultrasonic flowmeter shall be provided with the pre-fabricated flume or weir suitable for installation into the open channel with dimensions as specified in the Particular Specification. The supplier shall submit the installation details of the flume or weir and obtain the approval of the purchaser prior to the delivery of the equipment.

If an existing flume or weir is provided in the open channel as specified in the Particular Specification, the supplier shall provide the necessary details and procedures for the calibration of the equipment at site. Should the equipment fail to show the expected values in the calibration, the supplier shall verify whether there is any fault in the equipment supplied and fix the problem at his own cost.

Delivery of the equipment shall accompany with its factory test report with not less than five calibration testing points.

2. DESIGN

The ultrasonic flowmeter shall comprise an electronic module (transmitter), a non-contact ultrasonic sensor unit (transducer) and its associated signal cable. The sensor shall emit narrow beam ultrasonic pulses with the reflected waves received by the sensor. The time elapsed between the transmitting and receiving pulses shall be measured by the electronic module or built-in flow equation/computer programme that

converts the measured level signal into a current signal proportional to flow via menu selection or push-button programming to suit any flume or weir as required.

The ultrasonic flowmeter shall meet the following design requirements:

(a) Transmitter

Degree of protection : IP65 to IEC 60529  
of enclosure

Power supply : 220V 50 Hz or 24V d.c. as detailed in the  
Particular Specification

Temperature : 0°C to 60°C

Range : 0.5 to 5 m

Indication : Alpha numeric liquid crystal display or better

Analogue output : 4-20 mA  
signal

Digital output contacts : 2 nos. 4A 220V 50Hz Single pole double throw  
(SPDT) type

Digital : RS485 / RS232 / Fieldbus / Highway Addressable  
Communication Remote Transducer (HART) as detailed in the  
Particular Specification

(b) Transducer

Maximum range : 0.5 to 5 m

Temperature : 0°C to 60°C

Degree of protection : IP68 to IEC 60529  
of enclosure

(c) Overall accuracy of : The overall accuracy of the ultrasonic flowmeter  
the ultrasonic shall be  $\pm 0.25\%$  of the measuring range. It shall  
flowmeter be fitted with a built-in temperature compensation  
device to reduce the error caused by the  
temperature variation.