

## **232200S05 BUILDING STEAM CONDENSATE METERING**

### GENERAL OVERVIEW

This standard will review requirements for steam condensate for building-level systems.

A building steam condensate metering system shall be installed on any facility connected to the UK Central Steam System such that all steam used by the facility is metered. The metering shall consist of an electromagnetic flow meter located downstream of the main building condensate receiver tank. Multiple meters shall be used if required to measure the entirety of the building flow. This metering system shall measure total volumetric flow (gallons) as well as the flow rate (GPM) and report to the UK Building Automation System (BAS) under the direction of UK UEM Controls Engineering Manager.

Each flow meter and component shall be covered by the manufacturer's two year warranty. Any steam condensate systems installed in building distribution piping shall be designed for 150 psig water working pressure and 250°F temperatures.

Any process equipment that consumes campus steam such that the condensate is disposed of and not returned for measurement shall also locally measure the steam or condensate and report to Utilities for billing. Alternately, if the consumption profile is known an on/off or run time indicator may be installed and connected to FMS and the monthly usage shall be calculated for billing.

System designer shall be responsible for accurate and reliable metering, and any specification here within that may present an issue in a particular application should be addressed. Designer shall consult with UK Utilities Energy Engineer for any necessary exceptions to this standard. Design and installation shall follow all manufacturer specifications to ensure proper functionality. Installer shall perform field verification to demonstrate accurate and reasonable data upon completion of installation.

### FLOW SENSOR

Building condensate shall be measured by an in-line electromagnetic flow meter or turbine meter with remote display and shall adhere to UK Standard Drawing 232200D06. For each building system the flow meter shall be installed downstream of the building condensate receiver tanks and measure the condensate as it is pumped out of the facility. The meter shall be field serviceable and include a bypass valve per the Standard Drawing 232200D06 to allow the meter to be taken out of service while the condensate system remains functional. Additionally, a drain shall be installed after the meter for the occasion that condensate needs to be dumped to drain. Precaution shall be taken to prevent steam from reaching the meter (i.e. steam traps), as well as appropriate length of straight pipe and ensuring the meter remains full of water at all times per manufacturer specifications. Flow sensor shall be able to measure pumped condensate with conductivity >5  $\mu$ S. Accuracy shall be within  $\pm$  0.5% of flow rate for electromagnetic or  $\pm$  2% for turbines. The meter shall have ANSI 150 flanges and PTFE liner or other high temperature components as needed.

### DIGITAL DISPLAY

Each meter shall have a local totalizing digital display. Display components to be enclosed in a NEMA 4 or greater enclosure and all displays and alarms to be visible with enclosure shut. The display shall be remotely mounted from the flow sensor where high temperatures may be a concern based on manufacturer specifications. The display shall be mounted at an elevation between 2ft and 5ft from the floor in an accessible location. The shortest practical cabling length available (16ft) is preferred for electromagnetic versions.

The following data points shall be visible locally from the digital display and reported to the BAS.

Flow total (Gallons)  
Instantaneous water flow rate (GPM)

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**Dated: 7/2019**

**Applies to: All Projects  
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### COMMUNICATIONS

Flow meter shall communicate to BAS with BACnet (IP, MSTP, or Modbus RTU) and may be installed with a new controller/display or connect to an existing controller with permission from UEM Controls Engineering Manager.

### DATA & TRENDS

The metering systems shall have local memory such that a loss of power or connectivity does not result in the loss of data. System must resume full functionality automatically when normal power or connectivity is restored.

The FMS shall calculate pounds of steam (LBS) from the flow total (gallons) using the following equation.

$$\text{Steam Total (LBS)} = \text{Condensate (gallons)} \times 8.345 \text{ lbs/gallon}$$

Steam total (LBS), flow rate (GPM), and flow total (Gallons) shall be trended in the building automation system as follows and passed through to the Utility Data Historian.

Table 1: Condensate Meter Data Points		
Points	Trend Frequency	Alarm
Device Status	COV	Offline
Condensate Flow Volume Total (gal)	600 seconds	none
Condensate Flow Rate (gpm)	COV	none
Steam Total (LBS) - calculated	600 seconds	none

### DOCUMENTATION

Provide a complete set of system documentation in a digital format for library archival. Documentation to include installation, calibration, operation, maintenance and repair manuals of sufficient detail to enable customer to install, calibrate, operate, maintain and repair the complete system. Documentation also to include warranty details, circuit schematics, wiring interconnection diagrams and necessary mechanical drawings.

The local display for building steam condensate meters shall be labeled on the face in a durable method with the following information:

Campus Steam Condensate  
Building Name, Number, Room  
Meter Instance Number (UK Assigned) or equivalent  
Meter IP Information (UK Assigned) or equivalent  
Power Panel Circuit Feed

### ACCEPTABLE MANUFACTURERS

Onicon FT-3100 Inline Electromagnetic Flow Meter with remote display  
Badger Industrial Turbine Meter MS-ER1 (Bronze head, EPR seals)  
Honeywell Elster AMCO H4400 Turbine Meter  
*Or equal, as approved by UEM Energy Engineer*

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