

GENERAL ORDER 58-B
(Supplemental to General Order 58-A)

**PUBLIC UTILITIES COMMISSION OF THE
STATE OF CALIFORNIA**

HEATING VALUE MEASUREMENT STANDARD FOR GASEOUS FUELS

Approved October 17, 1984. Effective November 16, 1984.
(Decision 84-10-052, CII 83-11-01)

Original Order Approved December 28, 1955—Effective January 17, 1956

IT IS ORDERED that the following rules be adopted effective November 16, 1984 to govern all gas corporations as defined in the Public Utilities Code,* in the determination of heating values of fuel gases. The order also is supplemental to General Order 58-A, which requires utilities to provide and maintain heating value measurement stations and shall not relieve any gas corporation from complying with the provisions of General Order 58-A.

The order herein comprises the following sections:

1. Applicability of Rules
2. Deviation from Rules
3. Definition of Terms
4. Approved Types of Heating Value Measurement Devices
5. Approval of New Devices for Heating Value Measurement
6. Installation, Operation, and Maintenance Requirements
7. Installation Report
8. Calibration of Heating Value Measurement Devices
9. Heating Value of Gaseous Fuels Used for Billing Purposes
10. Heating Value Measurement Records
11. Faulty Operation of Approved Equipment
12. Minimum Requirements

1. Applicability of Rules

- a. The following rules shall apply to any person, firm or corporation now or hereafter engaged as a public utility in the business of furnishing manufactured gas, natural gas, hydrocarbon gas, or a mixture of fuel gases for residential, commercial, industrial or other purposes within the State of California where the gas service rendered is subject to the jurisdiction of the Public Utilities Commission of the State of California.
- b. Only heating value measurement devices which have been approved by the Commission may be used to determine the

* "Gas Corporation" includes every corporation or person owning, controlling, operating, or managing any gas plant for compensation within this State except where gas is made or produced on and distributed by the maker or producer through private property alone solely for his own use or the use of his tenants and not for sale to others. Gas corporations are also herein referred to as "utilities" or "gas utilities".

heating value, used for billing purposes, of fuel gases produced, purchased and distributed by gas utilities subject to the Commission's jurisdiction.

2. Deviation from Rules

Commission authorization is required for public utilities to deviate from these rules. In case of hardship, an application for a deviation may be made to the Commission. The application shall include a complete description of the need for the deviation and how it will alleviate the hardship.

3. Definition of Terms

a. Fuel Gas

Any combustible gas or vapor, or combustible mixture of gaseous constituents, used to produce heat by burning.

b. Fuel Gas Calorimeter

An apparatus for determining the calorific (heating) values of fuel gases.

(1) Recording Calorimeter

An automatic device that continuously makes a written record of the heating value of a fuel gas, or mixture of fuel gases, on a chart.

c. Gas Chromatograph

A device operating on the principle of selective adsorption for determining the compounds which make up a gaseous mixture.

d. Computerized Gas Chromatographic Heating Value Measurement Device

A system which calculates the heating value of a fuel gas mixture using a computer operating in conjunction with a gas chromatograph.

e. Heating Value Measurement Station

The location at which a heating value measurement system is maintained for the purpose of determining the heating value of a fuel gas.

f. Standard Temperature

60°F., based on the international temperature scale.

g. Standard Pressure

A pressure of 14.73 psia.

h. Standard Cubic Foot of Gas

The amount of gas that occupies one cubic foot at standard temperature under standard pressure and saturated with water vapor, or free of water vapor (dry) as specified. (The total heating value of one dry cubic foot of gas is equal to the product of the total heating value of one saturated cubic foot of gas and the constant 1.0177.)

- i. **British Thermal Unit (Btu)**
The quantity of heat that must be added to one avoirdupois pound of pure water to raise its temperature from 58.5°F. to 59.5°F. under standard pressure.
- j. **Total or Gross Calorific (Heating) Value**
The number of British thermal units evolved by the complete combustion, at constant pressure, of one standard cubic foot of gas with air, the temperature of the gas, air and products of combustion being 60°F. and all of the water formed by the combustion reaction being condensed to the liquid state.
- k. **Net Calorific (Heating) Value**
The number of British thermal units evolved by the complete combustion, at constant pressure, of one standard cubic foot of gas with air, the temperature of the gas, air and products of combustion being 60°F. and all of the water formed by the combustion reaction remaining in the vapor state. The net calorific value of a gas is its total calorific value minus the latent heat of vaporization at standard temperature of the water formed by the combustion reaction. Latent heat of vaporization of water at 60°F. = 1059.6 Btu per lb. or 50.42 Btu per standard cubic foot.
- l. **Theoretical Air**
The volume of air that contains the quantity of oxygen, in addition to that in the gas itself, consumed in the complete combustion of a given quantity of gas.
- m. **Excess Air**
The quantity of air passing through the combustion space in excess of theoretical air.
- n. **Combustion Air**
The air passing into the combustion space of the calorimeter (theoretical air plus excess air).
- o. **Products of Combustion**
All substances resulting from the burning of gas with its theoretical air, including the inert constituents of the gas and the theoretical air, but excluding excess air.
- p. **Flue Gases**
The products of combustion remaining in the gaseous state, together with the excess air.
- q. **Certified Calibration Gas**
A sample of natural gas of certified heating value. The sample must be of constant composition and heating value and contain no condensibles that will effect a change in its heating value with any temperature-pressure conditions to which the gas may be subjected. The certified calibration gas shall be traceable to the National Bureau of Standards. For Chromatograph type heating value measuring equipment, the calibra-

tion gas shall be a mixture that contains all components anticipated to be analyzed up to and including hexane.

r. **Reference and Calibration Gas**

Natural or mixed gas of constant composition and heating value, the heating value of which has been accurately determined by use of certified calibration gas. Such gas shall contain no condensibles that will effect a change in its heating value with any temperature-pressure change to which the gas may be subjected. For chromatograph type heating value measuring equipment, all components anticipated to be analyzed up to and including hexane, shall be contained in the reference calibration gas.

s. **Condensate**

The water that is condensed to the liquid state within the body of a calorimeter.

4. Approved Types of Heating Value Measurement Devices

A current record of approved types of heating value measurement devices shall be maintained in the Commission's files.

5. Approval of New Devices for Heating Value Measurement

a. All devices measuring heating value of gaseous fuels for billing purposes must be approved by the Commission. A utility requesting Commission authorization of a device not previously approved, has the responsibility of developing and presenting appropriate data to the Commission to justify approval.

b. The request shall include a description of the new heating value measurement device, the justification for adoption, and data to demonstrate that the test results obtained from the use of such device are equal to or better than test results obtained with approved equipment. The test data obtained by the utility while testing the new device shall be compared with the data obtained from an approved type of device testing gas from the same source of supply at the same time and location. All tests must be run for a sufficient period of time to demonstrate the reliability and accuracy of the device. As a minimum, these tests shall be conducted for a period of three months. Complete records of the tests shall be maintained by the utility.

c. Preparatory to requesting approval of a new type of heating value measurement device, the Commission shall be notified in writing of the proposed tests so that the Commission staff may witness the installation at the time the test is in progress.

d. After approval of any manufacturer's specific model by the Commission, no further approval for subsequent units of the same model will be required, provided that changes to the approved model do not degrade the performance in terms of final Btu measurement output. A written notice from the

manufacturer to the utility shall be required explaining any such changes to an approved model. The utility shall send a copy of such statement to the Commission as evidence that no performance specifications have been degraded.

6. Installation, Operation, and Maintenance Requirements

a. Standards for Heating Value Measurement Devices

The standard methods for installing, operating and maintaining heating value measurement devices shall be in accordance with the manufacturer's applicable instructions and recommendations, as a minimum.

b. All gas samples must be representative of the process stream and taken from a location which is representative of the total stream flow.

7. Installation Report

a. Each gas utility shall file with the Commission at the time of installation of each heating value measurement device, or as soon thereafter as practical, a complete installation report setting forth applicable items of information contained in "Figure A" together with a location sketch and such other data or facts as may be pertinent to a suitable record of the equipment and facilities comprising a heating value measurement station.

b. To the "Installation Report" for each Cutler-Hammer calorimeter shall be attached a "Ground Plan" of the heating value measurement station, setting forth the outline of the building, the location of the calorimeter (s) within the building, the size, length, gas pressure and route of the gas sample pipe from the supply main to each calorimeter and the relative location of all secondary equipment for the operation of the calorimeter (s).

8. Calibration of Heating Value Measurement Devices

Heating value measurement devices shall be calibrated at periodic intervals using a gas of known heating value as defined in Items "q" and "r" of Section 3. For the Cutler-Hammer calorimeter, a calibration check and necessary adjustments shall be performed weekly. Other approved heating value measurement devices shall be calibrated automatically, at intervals recommended by the manufacturer. In each case, a calibration check report or proof of an automatic calibration shall be generated and kept on file for Commission inspection for a period of three years. Identification of the unit or equipment shall be included in the report.

9. Heating Value of Gaseous Fuels Used for Billing Purposes

All heating value measurement devices shall be used to determine the heating value of gaseous fuels for billing purposes shall register total or gross calorific value.

10. Heating Value Measurement Records

Each gas utility shall maintain a record, on suitable forms, of all required tests for a period of three years for examination and inspection by the Commission staff.

11. Faulty Operation of Approved Equipment

Should faulty operation occur with approved equipment, corrective action shall be taken immediately. If the problem cannot be corrected within seven (7) days of discovery, and alternate provisions cannot be made for obtaining an accurate heating value, the Commission shall be notified. The notification shall outline the problem and proposed correction.

12. Minimum Requirements

The requirements contained herein should be considered as minimum and any utility may adopt additional, or more stringent rules and practices provided they are not inconsistent with this order.

FIGURE A
HEATING VALUE MEASUREMENT DEVICE
INSTALLATION REPORT

GAS UTILITY _____ DATE _____

LOCATION OF HEATING

VALUE MEASUREMENT DEVICE _____ DIVISION OR DISTRICT

CITY _____ STATION, OR PLANT (NAME) _____

KIND OF GAS TESTED _____

BASIS OF MEASUREMENT—(60° F.—14.73 PSIA) DRY _____ OR
SATURATED _____

MEANS OF AIR CONDITIONING, IF ANY _____

PUBLICATION NO. OF MANUFACTURER'S APPLICABLE BOOK OF INSTRUCTIONS _____

FOR CUTLER-HAMMER RECORDING CALORIMETERS ONLY:

COMPANY NO. _____ DATE INSTALLED _____

SERIAL NUMBER, TANK UNIT _____ RECORDER UNIT _____

TYPE OF SCALE—UNIFORM OR SPLIT _____ SCALE RANGE _____

FOR OTHER HEATING VALUE MEASUREMENT DEVICES:

TYPE OF HEATING VALUE MEASUREMENT DEVICE _____

MANUFACTURER'S MODEL NO. _____ DATE INSTALLED _____

SERIAL NUMBER, ANALYZER _____ RECORDER _____

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