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ANSI/ASHRAE Standard 41.13-2023 (RA2026)
Standard Methods for Fuel Higher Heating Value Measurement

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NOTE

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FOREWORD

ASHRAE Standard 41.13 provides methods for determining the higher heating values needed for performance testing of fuel-burning heating, ventilating, air-conditioning, and refrigeration systems and components under laboratory and field conditions. This standard complies with ASHRAE's mandatory language requirements.

This is a reaffirmation of Standard 41.13-2023 and contains no changes. This standard was prepared under the auspices of ASHRAE. It may be used, in whole or in part, by an association or government agency with due credit to ASHRAE. Adherence is strictly on a voluntary basis and merely in the interests of obtaining uniform guidelines throughout the industry.

1. PURPOSE

This standard prescribes methods for determining fuel higher heating values.

2. SCOPE

This standard applies to determining fuel higher heating values for use in testing heating, ventilating, air-conditioning, and refrigeration systems and components under laboratory and field conditions.

3. DEFINITIONS

biodiesel: a liquid fuel derived from vegetable oils or animal fats as defined by ASTM D396 [1].

bio-derived gas: combustible gases produced from the microbial breakdown or thermal gasification of biomass (e.g., municipal waste, agricultural residues, and energy crops).

British thermal unit: the quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit at a specified temperature. (***Informative Note:*** As used in this standard, the Btu by default is based on the International Table definition (formally denoted as Btu_{IT} where necessary for clarity), but if a method of test standard or rating standard requires another reference temperature, then the specified reference temperature is provided in parentheses, e.g., Btu [60°F].)

heating value: the amount of heat released by the combustion of a known quantity of fuel.

higher heating value (HHV): a heating value that includes the latent heat of vaporization of water and is determined when water vapor formed from the combustion of fuel is cooled and condensed at standard conditions. Higher heating value is also referred to as "gross heating value."

lower heating value (LHV): a heating value that does not include the latent heat of vaporization of water and is determined when water vapor formed from the combustion of fuel remains in the vapor state. It is the difference between the higher heating value and the enthalpy of vaporization of water. Lower heating value is also referred to as "net heating value."

local conditions: the temperature, pressure, and moisture content of the fuel at the point where the HHV is of interest (e.g., the point where the fuel is burned or where custody transfer occurs).

manufactured gas: combustible gases traditionally produced from the gasification of coal, coke, and oil. These gases often contain a large fraction of hydrogen, carbon monoxide, and, sometimes, carbon dioxide.

refuse-derived fuels (RDF): fuels that are produced from combustible components that the industry calls "municipal solid waste." This waste, usually taken from industrial or commercial sites, is shred, dried, baled and then finally burned.

residual moisture: water present in a sample of solid fuel after it is air dried in accordance with the sample preparation procedure prescribed by the referenced HHV test method.

4. CLASSIFICATIONS

4.1 Fuel Type Classification. Fuels that are within the scope of this standard are classified according to physical state: gaseous, liquid, and solid.

4.2 HHV Test Methods and Example Fuels. Table 1 includes a list of fuels used for heating, ventilation, air-conditioning, and refrigeration (HVAC) applications, along with the corresponding HHV test methods referenced by this standard. This standard applies to all fuels that fall within the scope of these HHV test methods.