



# CERTIFICATE OF TEST

for

Model 6100 Isoperibol Oxygen Bomb Calorimeter

Serial Number: \_\_\_\_\_

Firmware Version: \_\_\_\_\_

The Parr Instrument Company certifies that the calorimeter named above has satisfactorily passed all testing in accordance with the company's Quality Assurance program. The test criteria and results are summarized below:

Factory Determined EE Value	%RSD

### The Energy Equivalent Factor

The energy equivalent (EE) value, as listed on this certificate, is a factory value and must be further determined in the user's facility. The EE value determined by the user will vary from the value determined at Parr Instrument Company.

The term "standardization" denotes the operation of the calorimeter using calorific grade benzoic acid as the test sample. An average EE value or calibration factor for the instrument is derived from the results of a number of these tests. The EE value is defined as the amount of energy required to raise the calorimeter temperature one degree. This value is expressed as calories per degree Celsius.

### Standardization Procedure

A number of standardization runs with benzoic acid has been used to determine that this instrument meets Parr's Quality Standards. Using a pellet of calorific grade benzoic acid weighing not less than 0.9 nor more than 1.25 grams, the corrected temperature rise is determined from the observed test data.

The energy equivalent is computed by substituting in the following equation:

$$EE = \frac{Hm + e_1 + e_2 + e_3}{T}$$

Where :

EE = Energy equivalent of the calorimeter in calories per degree C

H = Heat of combustion of the standard benzoic acid sample in calories per gram

m = Mass of the standard benzoic acid sample in grams

T = Temperature rise in degree C

e<sub>1</sub> = Correction for heat of formation of nitric acid in calories

e<sub>2</sub> = Correction for sulfur (0)

e<sub>3</sub> = Correction for heating wire and combustion of cotton thread

### Precision

Calculating %RSD is a standard method for determining precision. The Upper Control Limit for this calculation will differ based on the number of standards analyzed, the Confidence Limit (CL) chosen and the precision class of the instrument. Parr utilizes a CL of 99.7% (3 sigma) and generally, analyzes 5 standards at the factory. Therefore, an acceptable limit based on these parameters is 0.40% for the 6100 Calorimeter, a 0.20% precision class instrument.

Parr Instrument Company's overall Quality Assurance System has been certified to be in compliance with ISO 9001-2000 by TÜV. The Quality Assurance program ensures that all aspects of the design, materials selection and procurement, manufacture, testing and certification of its calorimeters and combustion bombs are performed in accordance with accepted codes and practices. Individual calorimeters will be marked with the additional, appropriate certification on the nameplate of the unit.

Signed \_\_\_\_\_  
Date \_\_\_\_\_

Test