**INTERPRETATION IC 90.1-1989-14 OF**
**ASHRAE/IES STANDARD 90.1-1989**
**ENERGY EFFICIENT DESIGN OF NEW BUILDINGS**
**EXCEPT LOW-RISE RESIDENTIAL BUILDINGS**

January 25, 1993

Request From: Ms. Elena Schmid, California Energy Commission, Building and Appliance Efficiency Office, 1516 Ninth Street, Sacramento, CA 95814-5512

References: Table 10-8 on Page 95 of ASHRAE/IES Standard 90.1-1989 describes Standard Rating Conditions and Minimum Performance for Gas- and Oil-fired Boilers.

The minimum performance for gas-fired boilers $\geq$ 300,000 Btu/h is expressed in terms of $E_c$ which is defined in a footnote that reads:

> "$E_c$ = combustion efficiency, 100% - flue losses."

The column headed "Reference" lists four documents, the first being ANSI Z21.13-87. ANSI Z21.13.87 describes how to measure "thermal efficiency" but does not use the term "combustion efficiency."

Question: Is it the intent of the standard that effective January 1, 1992, the minimum performance of gas-fired boilers with input rating $\geq$ 300,000 Btu/h be 80% thermal efficiency as determined using ANSI Z21.13-87?

Answer: Yes.

Comment: The boiler standard, ANSI Z21.13-87, specifies a test for thermal efficiency. However, the actual test procedure described is a combustion efficiency test. The formula contained in ANSI Z21.13-87 for determining the efficiency is 100% minus flue losses.