

NORA Test Protocol

Idle Loss Test for Combination Hydronic Systems

Scope

This test method applies to residential appliances which meet both space heat and domestic hot water loads and which include any volume of water maintained hot during idle (no load) periods. This includes:

- Heating boilers which meet domestic hot water loads using an internal or external heat exchanger
- Heating boiler/domestic hot water tank systems
- Water heaters which are also used to meet space heating loads in residences
- “Tankless” water heaters which are intended to meet both loads and which include internal storage tanks

Summary of Test Method

Applicable systems are operated in an idle mode as per manufacturer's instructions and with all parameters adjusted as specified. All system controls are fully functional as in a non-heating season mode. The test period is started with the boiler and tank at their set point, i.e. the burner has just stopped firing. The system is allowed to undergo two “warm up” cycles and three test cycles in which the burner fires to make up for standby energy losses. Total fuel consumption and total duration for the three test cycles is measured. Average fuel energy input during the period is determined. Idle loss, expressed as a percentage is the ratio of average fuel energy input during this period to the full load, steady state fuel energy input of the system.

Discussion of Test Details

As with any test standard, many parameters, test conditions, and procedures will need to be specified to ensure that a fair comparison is made between different system types and configurations. Some of these are noted below:

- For an integrated system with a domestic hot water tank, the tank temperature and range in temperature during normal operation will need to be specified. This can be adopted from ASHRAE Standard 118.2.
- Idle loss for these systems is dependent on boiler water temperature set points. The set points used during this test will be consistent with the manufacturer's specifications.
- For boilers which provide domestic hot water using internal, tankless coils, the burner will cycle based on the low- and high-limit operating control settings. The manufacturer's specifications for these settings, as included in the manufacturer's instructions shipped with the boiler, will be used. If the manufacturer does not specify low- and high-control operating limits, the control shall be set for a low limit of 140 °F and a high limit of 160 °F during the idle test.
- For systems which include a boiler and a separate “indirect” hot water tank the boiler low- and high-limit operating control settings shall be as per the manufacturer's instructions shipped with the boiler. In some cases the manufacturer may specify cold start operation, in which case the low-limit shall be set at the lowest control setting. If the manufacturer does not specify low- and high-control operating limits, the control shall be set for a low limit of 140 °F and a high limit of 160 °F during the idle test.
- The energy input during the idle test will need to be corrected for any changes in the energy content of the boiler and water storage tank (where applicable / as per ASHRAE 118.2).
- Test specifications will be adopted to the greatest degree possible from existing and draft standards including ASHRAE 118.2, ASHRAE 103, ASHRAE 155 (Commercial boilers, draft), and BTS 2000.