

**APPENDIX 13-E**  
**FLORIDA STANDARD NO. 1 (FL-1)**  
**FLORIDA REGULATORY MODIFICATIONS TO AIR-CONDITIONING &**  
**REFRIGERATION INSTITUTE**  
**(ARI) STANDARD 470-80**  
**Effective April 1, 1986**

The following regulatory modifications made to the Air-Conditioning and Refrigeration Institute (ARI) Standard 470-80 shall constitute Florida Standard FL-1 and shall be accounted for in results testing performed on heat recovery units for which credit is claimed under Chapter 6 of the Florida Energy Code for Building Construction. All other criteria and conditions of ARI Standard 470-80 remain in effect. Testing to the Florida regulatory modifications shall not constitute testing to ARI Standard 470-80. ARI Standard 470-80 is hereby incorporated by reference.

**SECTION 1**  
**PURPOSE**

**1.1.1** This standard is to be used by the industry, including manufacturers, distributors, contractors, consulting engineers, and users of desuperheater/water heaters.

**SECTION 2**  
**SCOPE**

**2.1 Scope.**

This standard applies to desuperheater/water heaters supplied as separate components, as defined in Section 3.1 for residential potable water heating.

**SECTION 3**  
**DEFINITIONS**

**3.1 Desuperheater/water heater.** A factory-made assembly of elements by which the flows of refrigerant vapor and water are maintained in such heat transfer relationship that the refrigerant vapor is desuper-heated and the water is heated. A water circulating pump may be included as part of the assembly.

**3.2 Total Useful Heat Exchange Effect.** Total system hot gas superheat. The total heat removal required to completely desuperheat the refrigerant discharge vapor. This value is the product of the mass flow of refrigerant and the difference in enthalpy between the refrigerant vapor entering the desuperheater and the vapor at saturation leaving the desuperheater.

**SECTION 4**  
**STANDARD EQUIPMENT AND ACCESSORIES**

**4.1** The following items shall be required as standard equipment:

6. Installation manual, including owners' operating and maintenance instructions.

## SECTION 5 TESTING AND RATING REQUIREMENTS

**5.1.1** Published ratings shall state all the pertinent operating conditions and shall include the following:

d. Total useful heat exchanger effect, Btu/h(W)

i. Fouling factor (water side)

Net useful heat exchange effect expressed as percent of total hot gas superheat.

j. Total system hot gas superheat.

k. [j. becomes k.]

k. [k. Becomes l.]

**Note 1:** If a water circulating pump is included as part of the desuperheater assembly, as value of 2545 Btu/h (746 W) per rated horsepower shall be deducted from the useful heat exchange effect (d) to arrive at actual net useful heat exchange effect, Btu/h (W). If the pump motor is rated in watts (s), such value shall be used to determine Btu/h to be deducted. For systems with no water circulating pump, the net useful heat exchange effect is equal to the total useful heat exchange effect.

**5.1.2** Published ratings may also include a nominal refrigerating system capacity. The nominal system capacity in tons shall be based on a refrigerant 22 mass flow rate of 180 pounds per hour (.02268 Kg/s) per ton, and shall be given for at least one of the standard rating groups shown in Table 1. It shall be identified as to air cooled or water cooled rating.

### **5.2 Standard ratings.**

Published ratings shall include the standard rating, given for at least one of the standard rating groups shown in Table 1 and properly identified as the standard rating. standards ratings shall be cleaned ratings per 5.4.1.

### **5.3 Application ratings.**

Application ratings give performance data under operating conditions other than those shown in Table 1. Application ratings shall contain all information shown in Section 5.1.1, and such ratings shall be subject to the tolerances of this standard. The publication of application ratings is optional.

**5.3.1** Published application ratings may also include ratings with other fouling factors or means for determining ratings with other fouling factors. If a manufacturer elects to publish application ratings with other fouling factors, these ratings shall be determined in accordance with methods described in Section 5.4.2 and 5.4.3 below. Fouling factors shall be specified.

### **5.3.2 Reserved.**

## SECTION 7 MARKING

7.1 Each desuperheater/water heater shall have the following minimum information shown in a conspicuous place:

e. Water pump h.p. (watts), volts, amps

## SECTION 8 CONFORMANCE

### 8.1 Conformance.

All equipment represented as being in accordance with this standard shall conform to all of the provisions thereof.

### Table 1. STANDARD RATING CONDITIONS APPENDIX A. METHOD OF TESTING DESUPERHEATER/WATER HEATERS

#### SECTION A2 SCOPE

**A2.1 Scope.** This appendix applies to desuperheater/water heaters for residential potable water heating.

#### SECTION A3 DEFINITIONS

**A3.1 Desuperheater/water heater.** A factory-made assembly of elements by which the flows of refrigerant vapor and water are maintained in such a heat transfer relationship that the refrigerant vapor is desuperheated and the water is heated. A water circulating pump may be included as part of the assembly.

**A3.2 Total Useful heat exchanger effect.**

The useful heat transferred shall be the product of the mass flow of water, the specific heat and the temperature difference between entering and leaving water entering and leaving the desuperheater assembly.

**A3.3 Total heat exchange effect.**

The total heat removed from the refrigerant in the heat exchanger. This is the sum of the useful heat exchange effect and the heat loss through the external surfaces of the heat exchanger to the ambient air.

**A3.4 Total system hot gas superheat.**

The total heat removal required to completely desuperheat the refrigerant discharge vapor. This value is the product of the mass flow of the refrigerant and the difference in enthalpy between the refrigerant vapor entering the desuperheater and the vapor at saturation leaving the desuperheater.

#### SECTION A4 EXPRESSION OF TEST RESULTS

**A4.1.1** Test results shall be expressed in the following terms.:

- j. Refrigerant designation - R22
- k. Useful heat exchange effect, percent of total system hot gas superheat, %.
- l. Total system hot gas superheat, Btu/h.

## **SECTION A5 TEST METHODS**

**A5.1.1** Test shall consist of measurement of the following at specified conditions:

- i. Water pump watts
- j. Total system hot gas superheat, Btu/h

**A5.1.2** The total useful heat transfer effect shall be determined by:

- a. Multiplying the mass flow rate of water by the specific heat and temperature difference between entering and leaving water (total useful heat transfer effect).
- b. Multiplying the mass flow rate of refrigerant by the enthalpy difference between entering and leaving refrigerant and adding to this the heat effect of the pump if included as part of the assembly (see NOTE 1, para. 5.1.1).

A5.1.6 Reserved.