1998 STANDARD for

WATER CHILLING PACKAGES USING THE VAPOR COMPRESSION CYCLE

AIR-CONDITIONING & REFRIGERATION INSTITUTE

Standard 550/590

4301 NORTH FAIRFAX DRIVE • ARLINGTON, VIRGINIA 22203

IMPORTANT

SAFETY RECOMMENDATIONS

It is strongly recommended that the product be designed, constructed, assembled and installed in accordance with nationally recognized safety requirements appropriate for products covered by this standard.

ARI, as a manufacturers' trade association, uses its best efforts to develop standards employing state-of-the-art and accepted industry practices. However, ARI does not certify or guarantee safety of any products, components or systems designed, tested, rated, installed or operated in accordance with these standards or that any tests conducted under its standards will be non-hazardous or free from risk.

ARI CERTIFICATION PROGRAM PROVISIONS

Scope of the Certification Program

ARI 550 CERTIFICATION PROGRAM

All water-cooled centrifugal and rotary screw water-chilling packages with continuous unloading rated at or below 2000 tons at ARI Standard Rating Conditions, of the hermetic and open type, electric motor driven 60 Hz below 5000v, as covered by this standard, are included in the Certification Program. Included are chillers with single bundle shells (single water circuits or multiple condensers on a single water circuit are included).

ARI 590 CERTIFICATION PROGRAM

All positive displacement step unloading compressor and air-cooled rotary screw water chilling packages rated up to 1500 tons for water cooled condensers and up to 200 tons for air cooled condensers of the hermetic and open type, electric motor driven 60 Hz, 208v, 230v, 380v, 460v and 575v as covered by this standard (single water circuits or multiple condensers on a single water circuit are included).

Certified Ratings

The Certification Program ratings verified by test are:

1. Capacities, tons [kW],
2. Energy Efficiency, as applicable
   - Power Inputs per Ton, kW/ton [kW/kW]
   - Energy Efficiency Ratio (EER), Btu/W·h [W/W]
   - Coefficient of Performance (COP) [W/W]
3. Water Pressure Drops, psi or feet of water [kPa], all of the above at standard rating conditions (see Section 5.1) and at application rating conditions (see Section 5.2) for both full and part loads (see Section 5.3 for part load performance requirements),
4. Integrated Part Load Values (IPLV's) (see Section 5.3.1), and
5. Non-Standard Part Load Values (NPLV's) (see Section 5.3.2)*.

* Applies to ARI 550 certified products only.

Note:

This standard supersedes ARI Standard 550-92 and all addendum thereto and ARI Standard 590-92 and addendum thereto.

Price $20.00 (M) $40.00 (NM)
Printed in U.S.A.

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WATER-CHILLING PACKAGES USING THE VAPOR COMPRESSION CYCLE

Section 1. Purpose

1.1 *Purpose.* The purpose of this standard is to establish for water-chilling packages using the vapor compression cycle: definitions; requirements for testing and rating; minimum data requirements for published ratings; marking and nameplate data; and conformance conditions.

1.1.1 *Intent.* This standard is intended for the guidance of the industry, including manufacturers, engineers, installers, contractors and users.

1.1.2 *Review and Amendment.* This standard is subject to review and amendment as the technology advances.

Section 2. Scope

2.1 *Scope.* This standard applies to factory-designed and prefabricated vapor compression refrigeration water chilling packages including one or more hermetic or open drive compressors (centrifugal, rotary screw, scroll, reciprocating, or other types), equipped with either water-cooled, air-cooled, evaporative-cooled condensers or supplied without a condenser. This standard also covers water chilling packages with air or water-cooled heat reclaim condensers.

Section 3. Definitions

3.1 *Definitions.* All terms in this document will follow the standard industry definitions in the current edition of ASHRAE *Terminology of Heating, Ventilation, Air Conditioning and Refrigeration* unless otherwise defined in this section.

3.2 *Air-Cooled Condenser.* A refrigeration system component which condenses refrigerant vapor by rejecting heat to air mechanically circulated over its heat transfer surface causing a rise in the air temperature. Desuperheating and sub-cooling of the refrigerant may occur as well.

3.3 *Air-Cooled Heat Reclaim Condenser.* A heat transfer device which condenses refrigerant vapor, in the process of rejecting the heat of condensation to air, causing a rise in the air temperature. Desuperheating and/or sub-cooling of the refrigerant may occur as well. This condenser may be a separate condenser, the same as, or a portion of the air-cooled condenser.

3.4 *Bubble Point.* Refrigerant liquid saturation temperature at a specified pressure.

3.5 *Compressor Saturated Discharge Temperature.* For single component and azeotrope refrigerants, it is the saturated temperature corresponding to the refrigerant pressure at the compressor discharge. For zeotropic refrigerants, it is the arithmetic average of the dew point and bubble point temperatures corresponding to refrigerant pressure at the compressor discharge. It is usually taken at or immediately downstream of the compressor discharge service valve (in either case on the downstream side of the valve seat), where discharge valves are used.

3.6 *Dew Point.* Refrigerant vapor saturation temperature at a specified pressure.

3.7 *Energy Efficiency, Cooling.*

3.7.1 *Coefficient of Performance (COP)[W/W].* A ratio of the cooling capacity in Watts [W], to the total power input in Watts [W] at any given set of rating conditions.

3.7.2 *Energy Efficiency Ratio (EER).* A ratio of the cooling capacity in Btu/h [W] to the total power input in watts [W] at any given set of rating conditions.

3.7.3 *Power Input per Ton (kW/Ton).* A ratio of the total power input to the unit, including controls, in kW to the net refrigerating capacity in tons at any given set of rating conditions.

3.8 *Evaporatively-Cooled Condenser.* A refrigeration system component which condenses refrigerant vapor by rejecting heat to a water and air mixture mechanically circulated over its heat transfer surface, causing evaporation of the water and an increase in the enthalpy of the air. Desuperheating and sub-cooling of the refrigerant may occur as well.

3.9 *Fouling Factor.* The thermal resistance due to fouling accumulated on the heat transfer surface.

3.9.1 *Fouling Factor Allowance.* Provision for anticipated fouling during use specified in $h \cdot ft^2 \cdot {}^\circ F/Btu$ [$m^2 \cdot {}^\circ C/W$].