



Chiller Performance Testing Program

Proven performance under your watchful eye



The proof is in the testing



“Our primary focus in new HVAC systems is energy management, and it is critical to ensure that our systems will perform as designed. Using a witness performance test gives us the documentation to prove that we can operate as designed.”

– Larry Hood, senior construction manager for Volusia County Schools, Florida

“A witness performance test confirms to our customers what we say about our energy efficiency and performance. It is one great step towards earning their trust.”

– Kelly Strokes, LEED accredited professional, Trane sales engineer

Ensure chiller performance

Businesses around the world are being challenged to improve energy efficiency. According to the World Business Council for Sustainable Development, buildings worldwide account for 40% of global energy consumption. Of that amount, between 45% to 65% is used by the HVAC systems that keep building environments comfortable and healthy. The slightest inefficiencies in cooling and heating equipment create a huge energy drain and the financial impact is significant.

The first step in meeting your energy management goals is a Trane performance test. This verifies that your chiller will perform as specified under job site conditions.

Trane is the global chiller leader

As a business of Trane Technologies, Trane is a leading global provider of indoor comfort systems and solutions. Trane has manufactured centrifugal chillers in La Crosse, Wisconsin, US, the birthplace of Trane and the site of the world's leading building comfort research location since 1938. In 1987, a new manufacturing facility was constructed in Pueblo, Colorado where the renowned Trane Series R screw compressor water chillers are produced.

Being Trane's flagship factory in the Asia Pacific region, the new Taicang plant, relocated to the development zone from the old site at Taicang downtown occupies an area of 160,000m². It is an environmentally friendly and comprehensive integrated facility. Besides the production assembly lines, the modern world-class facility encompasses an R&D center, an advanced compressor assembly plant, an 800m² showroom and a training center, as well as a dozen laboratory and production testing loops. The key products include large chillers, commercial, residential and light commercial air conditioning products which are distributed to the Asia Pacific region, Africa, India, South America, Latin America, Middle East and Europe. Taicang has become a significant chiller manufacturing source to serve the global market.

Trane Taicang factory is ISO 14000 and OHSAS 18000 certified. It is also LEED™ (Leadership in Energy and Environmental Design) gold certified from the United States Green Building Council (USGBC). Our promise is to deliver air-con comfort in a green way.



Its location and the history

Taicang is a coastal city in Jiangsu Province of China and locates in the Yangtze River Delta region. It is approximately 60 kilometers to the northwest of Shanghai and 60 kilometers to the east of Suzhou. Meaning "grand barn" literally, Taicang is a place full of history and culture. It is the port from which the historic sea journeys to the west, led by Admiral Zheng He, were made in the early 15th century during the Ming Dynasty.



Performance testing to match your specifications

Computer selection programs predict chiller performance based on laboratory testing. Factory performance tests confirm that the actual chiller performance matches the predicted performance, and the results serve as a benchmark during the commissioning process.

We are committed to the highest level of design and manufacturing accuracy to make sure your chiller performs as expected.

There are 4 test loops in the facility designed to test screw chillers up to 450rt and centrifugal chillers up to 3,000rt. Plan is in place to expand testing capacity up to 4,000rt.

AHRI 550/590 certification

Trane chillers are AHRI (Air-conditioning, Heating & Refrigeration Institute) certified where applicable. It requires the use of AHRI certified selection program for performance prediction. Several times a year, AHRI tests random production chillers to verify that the predicted performance falls within the defined tolerance.

All Trane test stands in Taicang are approved by AHRI for certification testing. Each test facility undergoes an extensive and rigorous inspection process conducted by AHRI to gain approval for conducting AHRI certification tests.

AHRI 575 factory sound test

Trane low speed direct drive centrifugal chillers are the quietest in the industry. Sound test per AHRI standard 575 is available as an option.

The proof is in the testing

Measurement that counts

Accurate measurement is an integral part of performance testing. All the test loops are certified by both AHRI (Air-conditioning, Heating and Refrigeration Institute) and GMPI (Hefei General Machinery Research Institute). All the following instruments are calibrated by independent agency: watt meters, temperature sensors, flow meters, and differential pressure transducers. This ensures the instrumentation meets or exceeds the accuracy requirements of AHRI Standard 550/590. A copy of the latest calibration report is available upon request.

A poly-phase wattmeter measures the volts and amps per phase and the kW. Two platinum Resistance Temperature Detectors (RTDs) measure temperature at each location (entering and leaving evaporator water, entering and leaving condenser water for water-cooled). Magnetic flow meters measure the evaporator and condenser water flow. Differential pressure transmitters measure the water pressure drop.

Continuous real-time monitoring of these measurements is done for all performance and witness tests.

Part load conditions per AHRI standard, or at your specified conditions

Large chillers are tested at full load to determine the capacity and efficiency of the unit at design conditions. Part load testing, typically 75%, 50% & 25%, is also available, conducted under job-specific conditions, or per AHRI standard with temperature relief.



Research and development The testing process starts in research and development. We look at environmental performance, acoustic characteristics, operating longevity, and overall operating efficiency. After the chiller goes into production, we keep looking for ways to make it better, quieter, more reliable and more efficient.



Simulation of tubes fouling

Tubes in the chiller serve as the heat transfer surface. A certain amount of fouling will occur on the walls of the tubes after the chiller is operational. Fouling impedes heat transfer and makes the chiller work harder.

The predicted chiller performance anticipates slightly degraded heat-transfer performance due to the fouling factor specified. The test conditions will be adjusted so that the chiller works as hard during the test as it will after fouling has occurred.

The evaporator leaving water temperature is adjusted slightly lower. For water-cooled condensers the condensing entering water temperature is adjusted slightly higher.

We meet AHRI tolerances

When you select a Trane chiller, a product report is provided from the computer selection program that predicts performance. The purpose of a factory test is to verify the chiller operates at this performance level, within allowable tolerance as defined by AHRI.

The following AHRI tolerances apply:

- Flow rates $\pm 5\%$
- Leaving evaporator and entering condenser water temperatures $\pm 0.5^\circ\text{F}$ (0.3°C) of target
- Voltage $\pm 10\%$ of nameplate
- Frequency $\pm 1\%$ of nameplate

The tolerance for tons, kW/ton, and heat balance varies based on the chiller load and the operating conditions of the system as defined by AHRI formula. The specific tolerances for the test are listed on the test target sheet.

Recording of test data for your review

The computer data acquisition system records three sets of data at five minute intervals.

It displays the result of each data set. The results are averaged and a printed report is generated, showing test results of relevant performance parameters.

We will review this report with you to confirm that your chiller meets the test requirements.

Proven performance and quality workmanship



Test loop operation

Each test loop has an evaporator section and a condenser section. An interconnecting water distribution system allows us to create a cooling load for the chiller by adding hot leaving condenser water to the leaving evaporator water. At the same time, an equal amount of cold leaving evaporator water is added to the leaving condenser water to create the desired entering condenser water temperature. Usually this does not adequately reduce the water temperature, so some external cold water is injected to maintain the target entering condenser water temperature. This cold water supply source is from the testloop chiller system, part of the test-loop setup. An equal amount of hot water is discharged from the system.

A performance test will ensure your chiller will start up and operate without problems when it reaches the job site. You can confirm your chiller performance at design conditions before it ships to the job site.

Learn more at trane.com



Trane – by Trane Technologies (NYSE: TT), a global climate innovator – creates comfortable, energy efficient indoor environments through a broad portfolio of heating, ventilating and air conditioning systems and controls, services, parts and supply. For more information, please visit trane.com or tranetechnologies.com.

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RF-SLB008C-EN
07/13/2020