Trane® myTest™ Water-cooled Chiller Performance Validation

What you spec is what you get*

TRANE TECHNOLOGIES

Trane CenTraVac chillers: Designed and built to be the best; tested to prove it

Ongoing innovation. Unmatched capabilities. Lasting commitment. And over 75 years of experience in designing and manufacturing centrifugal chillers for our customers around the world. This is what Trane offers — and you can experience it all at our chiller manufacturing and testing facility in La Crosse, Wisconsin, USA.

Trane® CenTraVac™ chillers leverage five foundational design pillars: a direct drive, semi-hermetic, multi-stage compressor utilizing a low pressure refrigerant and patented control algorithms working together to produce the most reliable chiller with the highest efficiencies. That efficiency is one of many reasons why the CenTraVac chiller is the first — and only — commercial chiller in the world to earn Environmental Product Declaration (EPD) registration based on a third-party life cycle assessment.

Ensuring performance

Factory performance tests confirm that your chiller's actual performance matches what was predicted during the selection process before the chiller is installed on site.

Testing performance for your facility

Standard AHRI tests are a well-recognized industry practice, performed by all chiller manufacturers. However, a chiller's operating conditions vary significantly based on the needs of the building and its occupants. Data centers, hospitals and retail locations all have specific requirements unique to their application and location. With today's evolving HVAC system designs and customers' diverse performance expectations, standard AHRI tests are often no longer sufficient to accurately confirm that a chiller will operate as required.

That's why Trane designed and built an industry-leading testing facility, capable of evaluating performance based on customer-defined parameters including building type and geographical location. Before the chiller leaves the factory, the new Trane myTest™ program validates chiller performance under the conditions at which it should operate once installed.

*At the time of the test, chiller performance will be evaluated against the approved submittals and operating parameters established by the final selection configuration as approved by the customer prior to the manufacture of the equipment and in accordance with the overall capabilities of the testing facility.

Testing technology

The industry's most advanced and comprehensive chiller testing facility is capable of efficient, customizable testing for virtually any water-cooled chiller from virtually any manufacturer.

The test loop water temperatures are precisely controlled to simulate real-world conditions. Patented flow control technology delivers flow rates from 150 to 15,000 gpm and Tracer AdaptiView™ controls with flexible test packages provide an accurate test for either a single chiller or two simplex chillers installed in series.

MYTEST™ CERTIFIED

Testing and proof-of-performance capabilities

The fully customizable portfolio of myTest™ chiller test packages and proof-of-performance options is unsurpassed in the industry. And because these test packages are not manufacturer specific, Trane can offer them on virtually any water-cooled chiller from any manufacturer.

AHRI testing

Chiller efficiency is measured at full load and part load operation. AHRI Standard 550/590 defines the entering condenser water temperatures for loads of 100, 75, 50 and 25 percent. Each point is tested, and then the Integrated Part Load Value (IPLV) can be calculated.

Although some manufacturers focus on IPLV only, high efficiency at full load determines the capability of the chiller to minimize the electrical infrastructure required, and reduces the impact of demand-based charges and real-time pricing during peak periods. The full load efficiency rating is required for buildings to comply with most local codes. Both full load and IPLV ratings are required for LEED® Energy and Atmosphere (EA) credits.

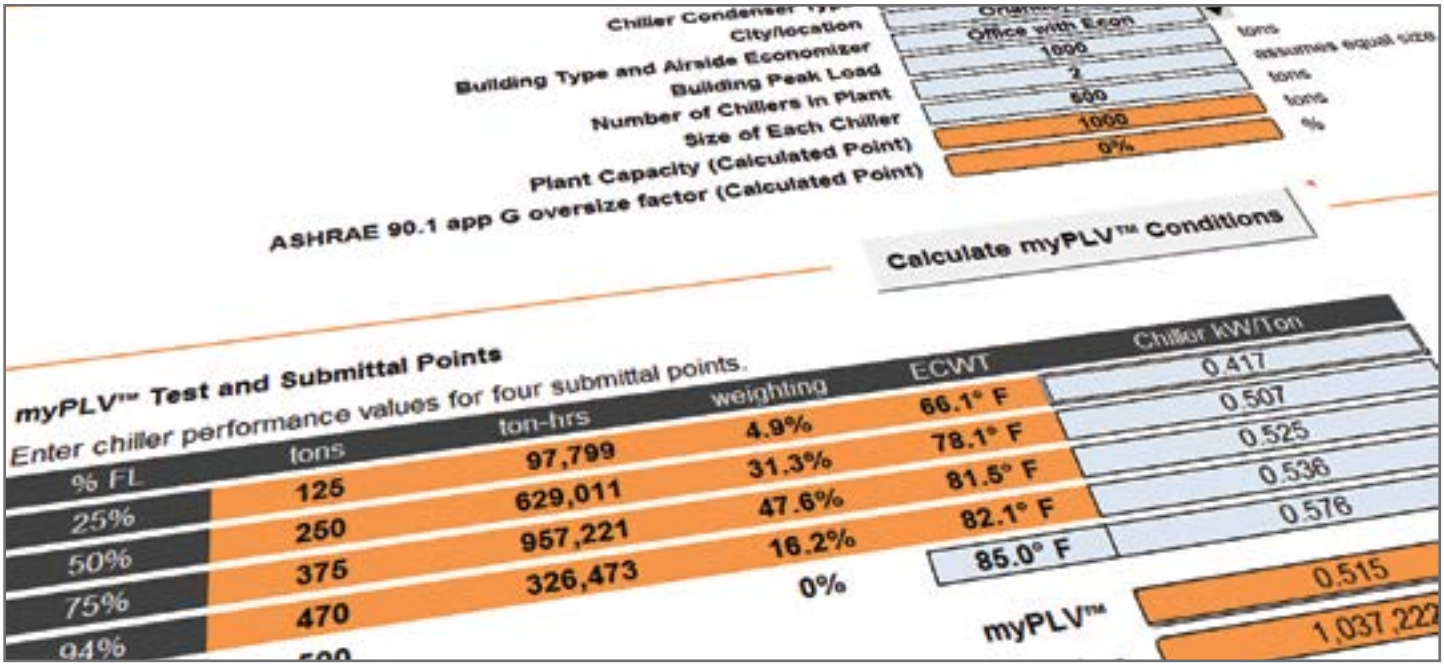
myPLV verification

While verifying chiller performance in real-world conditions is at the core of Trane testing capabilities, accurate performance starts at the design stage by calculating the required myPLV™ rating points.

The manufacturer-agnostic myPLV tool leverages industry-standard building model data, calculating four performance points (94, 75, 50 and 25 percent) based on the specific building type, location and plant design, providing accurate weighting points and condenser temperatures. The myPLV tool also calculates the ton-hours at each of those points necessary to accurately estimate annualized energy use.

Utilizing the myPLV tool from the beginning assures that the selected chiller is appropriate for the particular application. Then, myTest certification confirms the chiller performs as expected.

Tests and demonstrations are completed in accordance with AHRI Standard 550/590 [I-P] and ANSI/AHRI Standard 551/591 [SI] test procedures and tolerances, unless otherwise noted.



To learn more, or to download a free copy of the myPLV tool, please visit Trane.com/myPLV.

Test packages

Standard four-point AHRI test

From the AHRI website (ARI.org): “Certifying that products perform to industry standards ultimately leads to energy savings, environmental improvement and enhanced quality of life. Without proof that a heating, air conditioning, ventilation or commercial refrigeration equipment or components has been AHRI Certified™, you don’t know what you are getting.” Testing demonstrates that the chiller can achieve the performance predicted when the chiller was selected.

Standard five-point myPLV test

According to AHRI Standard 550/590, Appendix D: “The IPLV value was not intended to be used to predict the annualized energy consumption of a chiller in any specific application or operating conditions.” Conducting a myPLV analysis and subsequently testing to those parameters provides data to accurately predict chiller annual energy consumption, leading to reduced life cycle costs.

Standard four-point AHRI test + myPLV test

Combining the two tests validates both the energy analysis conducted with myPLV and the AHRI Certified selection.

Custom test points

A chiller’s performance depends on many factors, ranging from the desired chilled water temperature to the weather outside. Simulating a site’s unique conditions provides valuable insight into how the chiller performs prior to installation.

Zero tolerance test

AHRI allows for standard tolerances in its certified selections. Many customers accept these tolerances. However, selecting and testing to zero tolerance requirements ensures the full efficiency and performance benefit are realized.

ANSI/AHRI Standard 575 sound test

For projects requiring adherence to strict sound levels, confirming manufacturer claims of sound performance is imperative. Conducting a sound test in accordance with ANSI/AHRI Standard 575 test procedures provides this confirmation.

Series configuration test

When two chillers are installed in series, they interact and impact each other while operating as a single chiller. Testing two simplex chillers in a series configuration authenticates the predicted efficiency and performance of the chiller pair. The ability to test multiple chiller types in parallel and counterflow configurations provides the flexibility to model most application requirements.

Heat recovery and heat pump tests

The scope of AHRI Standard 550/590 does not include heat recovery and heat pump chiller testing. Yet, underperformance could result in reduced hot water production and lower-than-expected efficiency. myTest certification offers customers validation of selected unit performance.

Proof-of-performance packages

Variable primary flow

Whether it's a manufacturing, industrial or multiple chiller application, a chiller's ability to respond to rapidly changing flow conditions could mean the difference between uninterrupted operation and complete shutdown. Demonstrating the chiller's ability to handle design flow changes validates manufacturer claims.

Cold start

Free cooling and cold-weather operation applications introduce colder-than-normal water into the system, resulting in situations where the chiller may have to start with condenser temperatures colder than those in the evaporator. Confirming the chiller's ability to start under these conditions provides proof of the chiller's capabilities.

Rapid restart

For many mission-critical applications, bringing a chiller back online rapidly after a power loss is crucial. When every second counts, having this rapid restart capability proven on the test stand will demonstrate your chiller's ability to adapt to power-loss situations.

Free cooling

Integrated free cooling often eliminates the need for additional heat exchangers and the associated piping. The scope of AHRI Standard 550/590 does not include chillers with free cooling capabilities. Demonstrating performance in the free cooling mode during testing is paramount to understanding the potential life cycle savings expected from this option.

Unloading capabilities

Trane® chillers are designed and manufactured to unload to a minimum of 25 percent load without ambient relief, a capability unmatched by high-speed chillers. While the standard AHRI IPLV/NPLV unloading points represent part load operation, they do not demonstrate chiller performance on those days when the chiller will need to operate partially loaded with little to no relief from the tower. Demonstrating this condition will prove the chiller's ability to unload to selected levels.

In situations in which the application requires unloading down to near-zero percent, hot gas bypass is added to the chiller to reach these extreme load points. Demonstrating this feature will show hot gas bypass operation and validate actual chiller unloading capabilities.

Additional test and demonstration options

Total demand distortion (TDD) documentation

Variable frequency drives (VFDs) create electrical distortion, commonly referred to as harmonics, which can damage sensitive electronic equipment and, ultimately, lead to system degradation. Verifying manufacturer claims of low harmonic distortion (as defined by IEEE 519) helps ensure the selected chiller will not adversely affect the building's electrical service.

Long-duration testing

To run one test point per AHRI Standard 550/590 requires 15 minutes. Since performance of some chillers in the industry could fluctuate over time, this test option demonstrates chiller operation over longer periods of time, ensuring consistent performance.

Remote low- or medium-voltage Adaptive Frequency™ drive (AFD) test

When an application calls for a remote AFD with testing, customers may prefer to have the actual AFD used during the test. Utilizing a test loop that is capable of efficiently including the remote AFD as part of the test will ensure that all of the major components of the chiller are evaluated together.

Testing you can rely on

Accuracy and precision are a way of life at Trane — and our chiller test procedures are no exception. We employ multiple procedures to ensure test methodology and data are accurate and reliable.

Test instrument calibration

To ensure our chiller testing meets or exceeds the accuracy requirements of AHRI Standard 550/590, testing equipment is calibrated and validated by the National Institute of Standards and Technology (NIST). A copy of the latest calibration report is available on request.

Heat balance calculation

To confirm that the test data is valid, a heat balance is calculated to verify that the energy entering the system (at the evaporator and the motor) equals the energy leaving the system (at the condenser). The heat balance calculation does not verify if the performance is good or bad; rather, it validates that the quality of the data is good. Trane typically calculates a 100 percent load heat balance of ± 1.5 percent, which is tighter than the AHRI-defined heat balance tolerance.

Full load vibration test

Trane performs a vibration test on the assembled centrifugal chiller at the time of the 100 percent load test. The levels of vibration generated by the operating unit are so low, a nickel can balance on the edge of the main compressor-motor assembly.

Learning centers

A learning center is a dedicated working space for collaboration, brainstorming, innovation and best-practice sharing for your project with Trane systems, applications and product experts.

Adherence to AHRI tolerances

AHRI Standard 550/590 defines the allowable tolerances for performance tests, including:

- Flow rates ± 5 percent
- Leaving evaporator and entering condenser water temperatures ± 0.5°F of target
- Voltage ± 10 percent of nameplate
- Frequency ± 1 percent of nameplate
- Water pressure drop — maximum of:

  1.15 times rated pressure drop at rated flow rate OR rated pressure drop plus 2 feet of H_2O, whichever is greater

These tolerances apply to all standard AHRI tests, unless customized tolerances are defined.

Visit Trane.com/myTest to learn more.

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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