

** Intertek is an international, independent testing, inspection, and certification organization. It examines products from manufacturers and distributors to determine whether they comply with specified safety, quality, and technical standards.*

In this document, Intertek's testing laboratory in Guangzhou, China, carried out the tests on the GREE marine air conditioners. The tests included, among other things, electrical safety, overheating, insulation, leakage current, abnormal operation, and structural compliance.

An important distinction should be made:

- an Intertek test report confirms that the tested samples met the requirements of the specified standards;*
- this does not necessarily mean that the product has received full product certification;*
- the report specifically states that the additional requirements relating to use on ships were not considered.*

In this case, Intertek acted as an independent external testing body and assessed the safety of the GREE units in accordance with the applicable standards.

Summary of Safety Tests and Results

The safety compliance of the GREE CYR series marine air-conditioning units was assessed by Intertek, an independent testing laboratory.

Document identification details

- Test report number:** 210719054GZU-001
- Original issue date:** July 22, 2021
- Modification 1 date:** February 19, 2022
- Testing organization:** Intertek Testing Services Shenzhen Ltd., Guangzhou Branch
- Manufacturer:** Gree Electric Appliances, Inc. of Zhuhai
- Tested units:** GREE CYR16/NaC-T, CYR12/NaC-T and CYR20/NaC-T marine air conditioners
- Test period:** August 23, 2021 – February 17, 2022

Main technical characteristics of the tested units

The units are fixed-installation air-conditioning systems designed to be permanently connected to the electrical supply. They are classified as Class I electrical appliances and therefore require proper protective earthing.

The units:

- operate from a 220–240 V, 50 Hz or 230 V, 60 Hz power supply;
- use R410A refrigerant;
- are intended for indoor installation;
- are classified for use in locations not directly accessible to the general public;
- have a rated power input ranging from 1,630 W to 2,300 W, depending on the model.

Applied standards

The units were tested according to the European safety requirements applicable to air conditioners and similar electrical appliances.

According to the report, the units complied with the following standards:

- EN 60335-1 – General safety requirements for electrical appliances;
- EN 60335-2-40 – Particular safety requirements for air conditioners, heat pumps and dehumidifiers;
- EN 62233 – Requirements relating to electromagnetic fields.

The CYR12/NaC-T and CYR16/NaC-T models underwent full testing. For the CYR20/NaC-T model, the most important safety tests were also carried out separately due to constructional differences. The report also took into account the vibration test requirements of IEC/EN 60068-2-6.

Main tests and their results

Protection against electric shock

The units were checked to determine whether hazardous live parts could be accessed through the housing or openings.

The tests were carried out using standardized test fingers and measuring devices.

Result: hazardous live parts were not accessible. The protection against electric shock was found to be adequate.

Protective earthing and electrical connections

The earthing connections, mains connection, terminal blocks and internal wiring were inspected.

The tests verified that:

- the protective earth connection was secure;
- the wiring was properly fixed;
- the insulation could withstand the heat and mechanical stress occurring during use;
- the unit could be safely disconnected from the electrical supply after installation.

Result: the earthing system, wiring and electrical connections complied with the applicable safety requirements.

Power input

The actual electrical power input of the units was measured under normal operating conditions.

The purpose of the test was to confirm that the measured values corresponded to the data stated on the rating plate.

Result: the measured power input remained within the permitted tolerance range.

Heating test

The units were operated in both cooling and heating modes under unfavourable operating conditions.

The following temperatures were measured, among others:

- compressor and fan motor temperatures;
- motor winding temperatures;
- temperatures of wiring, connections and electrical components;
- temperatures of the housing and refrigerant pipes.

The units were also operated at a test voltage higher than the rated supply voltage, up to 254.4 V.

Result: the measured temperatures did not exceed the permitted limits. No hazardous overheating occurred, sealing materials did not melt or flow, and the protective devices did not trip unnecessarily during normal operation.

Leakage current and dielectric strength

The units were tested to determine whether a hazardous level of electrical current could flow from internal electrical parts to the housing or other accessible components.

The insulation was also subjected to a high-voltage dielectric strength test.

Result: the leakage current remained below the permitted limit. No insulation breakdown or short circuit occurred during the high-voltage test.

Protection against moisture and condensate

The condensate tray was filled completely and then subjected to continuous overflow while the fans were operating.

The purpose of the test was to determine whether water could reach hazardous electrical parts or impair the insulation.

Result: condensate overflow did not cause a hazardous electrical fault. After the test, the unit continued to meet the electrical safety requirements.

Abnormal operation

The units were also tested under fault conditions that may occur as a result of malfunction or improper operation.

The tests included:

- fan motor blockage;
- locked-rotor testing of the compressor;
- restriction of air or water flow;
- failure of control components;
- short circuit or interruption of electrical components;
- operation of fuses and overload protection devices.

Some motors were tested in a blocked condition until the protective device operated or for the prolonged period required by the standard.

Result: abnormal operation did not cause fire, hazardous overheating, electric shock or serious mechanical damage. The overload protection devices operated correctly.

Compressor overload protection

The CYR12/NaC-T model was separately tested with a compressor fitted with an UP3-02A internal overload protector.

The test covered:

- compressor behaviour under locked-rotor conditions;

- operation of the overload protector;
- overheating;
- electrical safety after the test.

Result: the compressor overload protection operated correctly and no hazardous condition developed.

Electronic control fault testing

Various simulated faults were introduced into the electronic control system.

The tests included:

- short circuits between component terminals;
- interruption of circuits;
- capacitor failure;
- failure of relays and semiconductors;
- short circuits in low-power control circuits.

Result: faults in electronic components did not cause electric shock, fire, hazardous operation or mechanical injury.

Mechanical strength

The housing and structural parts of the unit were subjected to mechanical impact testing.

Standard spring-hammer impacts were applied to points considered potentially weak.

The tests also examined:

- strength of housings and guards;
- protection against dangerous moving parts;
- resistance of insulation materials to damage;
- safety of pressure-bearing components.

Result: the housing and structural parts did not suffer damage that would impair the safety of the unit. Dangerous moving parts remained inaccessible.

Resistance to heat and fire

Plastic, insulating and electrical components were assessed for heat and fire resistance.

The evaluation covered, among others:

- relays;
- terminal blocks;
- capacitors;
- electronic circuit boards;
- the four-way valve;
- fuses;
- electrical components associated with the compressor.

Result: the materials and components complied with the applicable heat- and fire-resistance requirements. During abnormal operation, no flames, molten metal or hazardous quantities of flammable gas were produced.

Refrigerant circuit and pressure resistance

The pressure-bearing parts of the refrigerant circuit were also checked.

The assessment covered, among others:

- the compressor;
- pipework;
- heat exchangers;
- the four-way valve;
- pressure switches;
- the high- and low-pressure sides of the refrigerant circuit.

Result: the pressure-bearing components of the refrigerant circuit complied with the prescribed safety requirements.

Markings and instructions

The rating plate and product documentation were checked to confirm that they contained the information required for safe installation and operation.

This information included:

- rated voltage and frequency;
- power input;
- refrigerant type and quantity;
- maximum operating pressures;

- protective earth marking;
- wiring diagram;
- installation dimensions and clearances;
- water pressure and temperature limits;
- method of disconnection from the power supply.

Result: the markings and user documentation complied with the examined standards.

Overall result

In the report, the designation **P – Pass** means that the relevant requirement was fulfilled, while **N/A** means that the particular test was not applicable to the unit due to its design.

The test report does not contain any failed result that would exclude the overall safety compliance of the units.

The GREE CYR12/NaC-T, CYR16/NaC-T and CYR20/NaC-T marine air conditioners, in the tested configurations, complied with the applicable requirements of EN 60335-1, EN 60335-2-40 and EN 62233.

This means that the tested samples met the requirements relating to electrical safety, overheating, insulation, abnormal operation, mechanical strength, fire resistance and electromagnetic fields.

It is important to note that the results of the report apply only to the tested samples, the listed models and the component variants covered by the document. The document itself is a test report and does not automatically mean that the product is part of an ongoing Intertek certification programme.