

**** 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 the Test Report

1. Subject of the Test

The Intertek assessment covered the electrical, mechanical, and general safety compliance of GREE CYR-series marine air-conditioning units.

The models included in the report were:

- CYR5/Na-T**
- CYR9/Na-T**
- CYR12/Na-T**
- CYR16/Na-T**
- CYR24/Na-T**
- CYR5/NaB-T**
- CYR9/NaB-T**
- CYR12/NaB-T**
- CYR16/NaB-T**

- CYR5/NaC-T
- CYR9/NaC-T
- CYR24/NaC-T

The appliances were assessed as fixed-installation, Class I electrical appliances intended for permanent connection to fixed wiring. The models operate with R410A refrigerant and have a rated power supply of 220–240 V, 50 Hz, or 230 V, 60 Hz.

The tests were carried out between 23 August 2021 and 17 February 2022.

2. Applied Standards

Compliance was evaluated according to the following standards, among others:

- EN 60335-1 – General safety requirements for household and similar electrical appliances;
- EN 60335-2-40 – Particular safety requirements for electrical heat pumps, air conditioners, and dehumidifiers;
- EN 62233 – Measurement of electromagnetic fields generated by household electrical appliances.

The report also took the applicable European national differences and supplementary requirements into account.

3. Detailed Summary of the Tests

3.1 Classification and Basic Construction

The assessment verified whether the appliances' electrical protection class, installation category, and intended-use classification were consistent with their construction.

The units were classified as:

- Class I electrical appliances;
- appliances requiring protective earthing;
- fixed-installed equipment;
- appliances permanently connected to fixed wiring;
- products intended for indoor use;
- appliances not accessible to the general public.

Result: The classification complied with the applicable requirements.

3.2 Markings and Instructions

The information shown on the appliances and rating plates, as well as the contents of the installation and operating instructions, were checked.

The examination covered, among other items:

- **manufacturer and brand name;**
- **model identification;**
- **rated voltage;**
- **mains frequency;**
- **rated power input;**
- **refrigerant type and charge quantity;**
- **permissible operating pressures;**
- **protective earth marking;**
- **electrical connection information;**
- **markings for switches and controls.**

The installation instructions were also checked to confirm that they included:

- **the dimensions of the space required for correct installation;**
- **minimum installation clearances;**
- **an electrical wiring diagram;**
- **the method of connection to the power supply;**
- **the permitted temperature and pressure ranges of the water circuit;**
- **instructions for secure mounting;**
- **requirements for complete disconnection from the mains supply.**

Result: The markings and documentation complied with the assessed standard requirements. The report also notes that, when placing the appliances on the market, the importer and manufacturer must indicate their name, registered trade name or trademark, and a postal address at which they can be contacted.

3.3 Protection Against Electric Shock

The tests assessed whether live parts could be touched during normal use, installation, removal of covers, or through accessible openings.

Standardised test fingers and probes were used to verify that:

- **users or service personnel could not touch parts carrying hazardous voltage;**

- the enclosures provided adequate protection;
- parts accessible before installation were properly insulated;
- exposed conductive metal parts requiring earthing were reliably connected to the protective earth system.

Result: No hazardous live parts were accessible, and the protection against electric shock was found to be adequate.

3.4 Power Input and Current

The actual electrical power input of the appliances was measured at normal operating temperature and rated supply voltage to verify that it corresponded to the values shown on the rating plates.

The measurements were performed under the voltage and operating conditions prescribed by the standard.

Result: The measured power input remained within the permitted tolerances and complied with the declared rating-plate values.

3.5 Heating and Overheating Tests

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

Temperatures were measured on components including:

- electric motors and windings;
- the compressor;
- cables and electrical connections;
- electrical components;
- enclosures and accessible surfaces;
- refrigerant pipes.

The appliances were also tested at a voltage above the upper rated voltage. For example, for a maximum rated voltage of 240 V, tests were carried out at 1.06 times this value, corresponding to 254.4 V.

The tests verified that:

- no hazardous overheating occurred;
- the temperature of insulating materials remained below the applicable limits;

- protective devices did not operate during normal conditions;
- sealing or insulating compounds did not flow out;
- the units operated safely in both cooling and heating modes.

Result: The measured temperatures did not exceed the applicable limits. No hazardous overheating occurred, and the protective devices did not operate during normal use.

3.6 Leakage Current and Electric Strength

Leakage current was measured both at operating temperature and at room temperature.

The insulation system was also tested to confirm that it could withstand the prescribed high-voltage electric-strength test.

The assessment included:

- measurement of leakage current between live parts and accessible conductive parts;
- application of the specified test voltage to the insulation system;
- checks for electrical breakdown or flashover;
- examination of the supply cable, cable entry, and cord anchorage insulation.

Result: The leakage current remained below the permitted limits, and no insulation breakdown occurred during the electric-strength tests.

3.7 Resistance to Moisture and Water Overflow

The condensate drainage system and drain pan were subjected to an overflow test.

The drain pan was filled to the brim and continuous overflow was created while the fans were operating. The unit was then checked to ensure that water had not reached electrical parts where it could cause electric shock or insulation failure.

Result: The overflow test was passed. After the test, the appliance continued to comply with the leakage-current and electric-strength requirements.

3.8 Abnormal Operation

The units were tested under various abnormal or foreseeable fault conditions that could occur during normal use.

The tests included:

- blocked fan motors;

- compressor starting and overload conditions;
- restricted or interrupted heat-transfer-medium flow;
- restricted airflow;
- loss of water flow;
- malfunction of control devices;
- short-circuit or open-circuit faults in electrical components;
- faults in electronic components;
- operation of fuses and overload-protection devices.

The fan motors were also tested with locked rotors until either the protective device disconnected the circuit or the specified test duration had elapsed.

The tests verified that abnormal operation did not result in:

- a fire hazard;
- hazardous temperatures;
- dangerous damage to the enclosure;
- risk of electric shock;
- failure of protective devices;
- loss of electric strength after the test.

Result: No hazardous condition developed during abnormal-operation and locked-rotor tests. The overload and overheating protection devices operated correctly.

3.9 Electronic Control Circuit Fault Tests

Simulated faults were applied to the electronic control circuits.

The tested fault conditions included:

- open-circuit faults in conductors or components;
- capacitor short circuits;
- short circuits between electronic component terminals;
- semiconductor failures;
- integrated-circuit failures;
- optocoupler and relay faults;
- short circuits in low-power circuits.

The faults were introduced individually, and in each case the appliance was checked to confirm that it did not become unsafe.

Result: Faults in the electronic circuits did not create an electric-shock, fire, or mechanical hazard. The safety of the appliance did not depend solely on the correct functioning of a single electronic component.

3.10 Compressor and Overload Protection

The operation of the compressor and its behaviour under locked-rotor conditions were examined.

As part of the latest modification, the CYR12/Na-T model was tested with a compressor fitted with a UP3-02A internal overload protector.

The tests covered:

- compressor temperature rise;
- current under locked-rotor conditions;
- operation of the overload protector;
- safe restarting;
- electric strength after abnormal operation.

Result: The compressor and its overload-protection device complied with the applicable safety requirements.

3.11 Mechanical Strength and Structural Safety

The mechanical suitability of the enclosures, fixings, screws, electrical connections, and structural parts was assessed.

The examination verified that:

- enclosures would not deform dangerously during normal use;
- cables would not contact sharp or moving parts;
- connections would not loosen;
- structural parts were securely fixed;
- controls would not cause hazardous operation;
- refrigerant pipes and pressure-containing components were adequately protected.

Result: The structural and mechanical design complied with the applicable requirements.

3.12 Internal Wiring and Mains Connection

The internal wiring, insulation, fixing, and current-carrying capacity of the conductors were examined.

The tests covered:

- conductor cross-sectional area;
- heat resistance of insulation;
- protection from sharp edges and moving parts;
- mechanical fixing of cables;
- suitability of terminals;
- construction of the mains connection;
- continuity of the protective conductor;
- reliability of the earthing connection.

Result: The internal wiring, mains connections, and protective earthing complied with the requirements.

3.13 Resistance to Heat and Fire

Plastic and insulating components were evaluated for resistance to heat and fire.

The assessment covered components including:

- terminal blocks;
- relays;
- capacitors;
- pressure switches;
- fan-motor components;
- the four-way valve;
- parts surrounding electronic circuits.

The report considered ball-pressure tests, glow-wire tests, flame-resistance tests, and applicable component certifications.

Where alternative components were used, the less favourable or more safety-critical test result was taken into account.

Result: The heat and fire resistance of the materials and components complied with the applicable requirements.

3.14 Refrigerant Circuit and Pressure Resistance

The refrigerant-circuit components exposed to pressure and the pressure-protection system were examined.

The assessment covered:

- the compressor;
- heat exchangers;
- pipework;
- connections;
- the four-way valve;
- pressure-protection switches;
- the permitted operating pressures on the high- and low-pressure sides.

The tests verified that the pressure-containing parts could safely withstand the pressures arising during normal and abnormal operation.

Result: The refrigerant circuit and its pressure-protection components complied with the applicable requirements.

3.15 Electromagnetic Field Assessment

The appliances were also evaluated according to the electromagnetic-field requirements of EN 62233.

The purpose of the assessment was to verify that the electromagnetic fields generated during operation did not exceed the applicable limits for household and similar environments.

Result: The appliances complied with the requirements of EN 62233.

4. Testing of Model Variants and Modifications

Not every test was repeated on every individual model.

Full testing was originally performed on the following models:

- CYR5/Na-T
- CYR9/Na-T
- CYR12/Na-T
- CYR16/Na-T
- CYR24/Na-T

For later-added or modified versions, the constructional differences were reviewed to determine which tests needed to be repeated.

The modifications included, among other things:

- **new enclosures;**
- **different installation methods;**
- **modified fan motors;**
- **a new main control board;**
- **an additional motor-starting capacitor;**
- **an AC contactor;**
- **relays;**
- **four-way valves;**
- **pressure switches;**
- **transformers;**
- **fuses;**
- **compressor overload protectors.**

Where a modification did not significantly affect safety, no additional physical test was carried out, and compliance was determined by documentation and component evaluation.

The tests repeated as part of the latest report mainly covered:

- **heating;**
- **compressor locked-rotor and overload conditions;**
- **abnormal operation;**
- **heat and fire resistance.**

5. Overall Result

The report uses the following verdict system:

- **P – Pass: the requirement was fulfilled;**
- **N/A – Not applicable: the requirement did not apply to the appliance;**
- **F – Fail: the appliance did not meet the requirement.**

The assessed clauses contain Pass or Not Applicable verdicts. The report does not identify any failed test that would invalidate the overall compliance of the product family.

The tested GREE CYR marine air-conditioning units complied with the requirements of:

- **EN 60335-1;**
- **EN 60335-2-40;**
- **EN 62233.**

This confirms that the tested samples met the applicable European electrical, thermal, mechanical, and general safety requirements for air-conditioning appliances.

6. Important Limitation

The report explicitly states that the additional requirements specifically associated with use on ships were not considered.

Therefore, the report:

- **confirms compliance with general electrical and appliance-safety requirements;**
- **confirms compliance with the EN 60335 standards applicable to air-conditioning equipment;**
- **does not, by itself, confirm full marine or maritime classification compliance;**
- **does not replace separate certification or approval by a marine classification society.**

The test results apply only to the tested samples and to the model variants assessed and listed in the report.