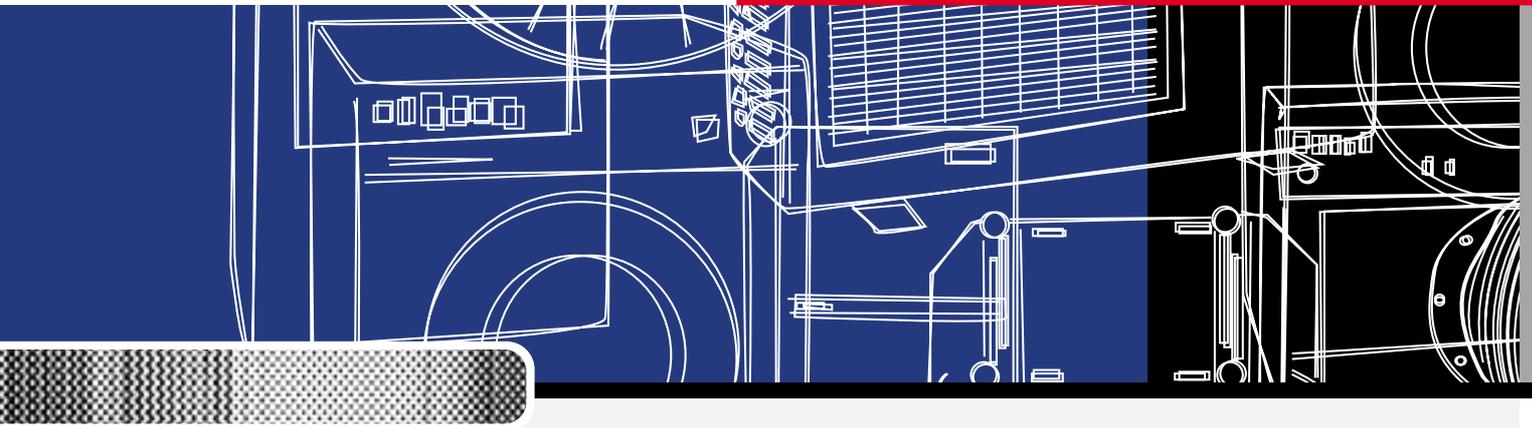


*NATIONAL APPLIANCE AND EQUIPMENT  
ENERGY EFFICIENCY PROGRAM*

## *VERIFICATION TESTING*



A report on independent  
laboratory testing of

**HOUSEHOLD REFRIGERATORS  
AND FREEZERS**

# **VERIFICATION TESTING**

**A report on independent  
laboratory testing of  
HOUSEHOLD REFRIGERATORS  
AND FREEZERS  
in Australia**

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## **Verification Testing Household Refrigerators and Freezers in Australia**

### ***Introduction***

This is the first report released by the National Appliance and Equipment Energy Efficiency Committee (NAEEEC) to report the outcome of an extensive independent testing program. This report details the results of testing a refrigerator and a freezer. However, when considering these results, they need to be placed in the context of the wider testing program commissioned by NAEEEC to cover all appliances subject to mandatory labelling and minimum energy performance standards.

A report on clothes dryers has been released at the same time as this report. NAEEEC will progressively release separate reports for domestic air conditioners and clothes washers later in 2001 from this round of testing. NAEEEC also expects to release reports relating to electric storage hot water units and dishwashers in 2002.

### ***Who we are ?***

NAEEEC comprises officials from government agencies with an interest in product energy efficiency drawn from all jurisdictions in Australia and in New Zealand. This committee is responsible for implementing the national greenhouse gas and energy efficiency programs on behalf of all Australian governments.

The National Association of Testing Authorities (NATA) in Australia is responsible for accrediting member laboratories to measure compliance to Australian Standards and, amongst other things, test the range of appliances subject to mandatory appliance labelling and minimum energy performance standards.

### ***Why conduct verification testing ?***

The national energy efficiency program is built on appliance labelling mandated by each state and territory under electrical safety regulation. For more than 10 years, NAEEEC members have tested appliances to verify manufacturer claims. NAEEEC and its predecessors have commissioned independent test laboratories who are accredited by NATA to undertake these tests to measure the energy use and performance of appliances and to confirm the accuracy of comparative efficiency labels attached to those appliances.

In 1999, NAEEEEC and NATA agreed to conduct a major review of the independent laboratories' capacity to test appliances to the exacting Australian and New Zealand appliance performance Standards. NAEEEEC took this decision to demonstrate the capacity of NATA laboratories to test compliance with the minimum efficiency levels specified for refrigerators, freezers and electric storage water heaters from late 1999 as well as for the new energy labelling requirements commencing in 2000.

In circumstances where governments are requiring suppliers to improve the energy efficiency of their products and consumers to pay potentially more for energy efficient products, NAEEEEC wanted to transparently demonstrate the capacity of testing authorities to accurately measure compliance with the new regulatory requirements.

### ***What was tested ?***

NAEEEEC agreed to fund NATA and its member laboratories to undertake a comprehensive testing program of all regulated appliance types in every independent NATA accredited laboratory in Australia. This program consisted of 13 products from 6 different product types being tested by 6 different laboratories resulting in 53 test reports. The main focus was to identify testing issues within each Standard that may require reconsideration by the relevant Standards Committees.

This "round robin" test program was undertaken with the assistance and expertise of the NATA who provided witnesses at each of the tests conducted in each laboratory. The initial round of testing was commenced in October 1999 with the final tests in this initial round completed in late March 2000. A program of follow-up tests is continuing in response to specific questions and queries raised by the original results for four of the six appliance types.

The round robin tested both the *repeatability* (the ability to obtain the same result on the same machine in the same laboratory) and *reproducibility* (the ability to obtain the same result on the same machine in a different laboratory) of the various test standards. The round robin sought to identify issues within each Standard that may require reconsideration by the relevant Standards Committee.

### ***What will change ?***

For appliances other than refrigerators and freezers, NAEEEEC is proposing changes to some of the test standards as a result testing undertaken for the round robin. NAEEEEC will share the results (subject to some confidentiality constraints) with other stakeholders as part of the process of continually improving public confidence in both appliance labelling and minimum energy performance standards. The results will be released progressively in 2001 and NAEEEEC proposes to assist suppliers' laboratories by allowing tests to be undertaken on the same units used in the "round robin" in their own laboratories.

It remains imperative that inter-laboratory variability in testing is minimised to acceptable measured levels and those levels are documented so those regulators only act on those cases of truly inaccurate labelling and standards. Regulators also want to keep the public (and the industry) aware of these testing issues.

This report contains the comparative results for each product but identification of each participating laboratory has been removed and the results for each product mixed to further protect the identity of participants. This report contains general comments on the possible reasons for the differences in results (where these exist), and the subsequent tests that have been commissioned in order to improve the results (where applicable). Detailed comments are contained in a separate laboratory specific report, which was made available to the participating laboratory, and to NATA.

More detail of this testing program can be found within the “Administrative Guidelines for Labelling and MEPS” which can be down loaded from the Australian Greenhouse Office web site:

<http://www.greenhouse.gov.au/energyefficiency/appliances/naecec/program.html>

### ***What refrigerators and freezers were tested ?***

Two products were chosen for the “round robin”, a Group 5 refrigerator (2 door frost free refrigerator-freezer with a top mounted freezer) and a group 6C chest freezer. These units represented were:

- Refrigerator: Sharp SJ48
- Freezer: Fisher & Paykel H 220

These units were purchased at random from a retail outlet.

### ***What laboratories participated ?***

NAEEEC accepted test reports from three laboratories that tested the refrigerators/freezers. All three laboratories are NATA accredited for refrigerator testing and have at various times performed check testing for NAEEEC.

While the identity of NATA accredited laboratories is not confidential, at the request of NATA and some of its members, NAEEEC has decided not to disclose the three laboratories whose results are contained in this report. Possible unwarranted commercial advantage is the reason for not declaring the names of the participating laboratories.

### ***What Standard was tested ?***

The test were conducted as specified in AS/NZS 4474.1-1997. Mr John Greenham, an expert assessor appointed by NATA, witnessed the tests of both products conducted in the three laboratories.

The energy consumption test specified in the Standard was conducted on each of the test units in all three laboratories.

### ***What did the NATA Observer find ?***

#### *Laboratory Facilities – Generally*

All of the laboratories' facilities were adequate to carry out refrigerator/freezer tests. These facilities include factors such as ambient control, test room conditioning equipment, and recording raw data.

#### *Environmental Conditions*

All laboratories were able to maintain the environmental conditions as required by the Standard.

#### *Instrumentation and Calibration*

All laboratories instrumentation such as energy meters, temperature recorders and temperature sensors were adequate to meet the requirements of the Standard and were within the period of re-calibration.

#### *Compliance by laboratories to Standards*

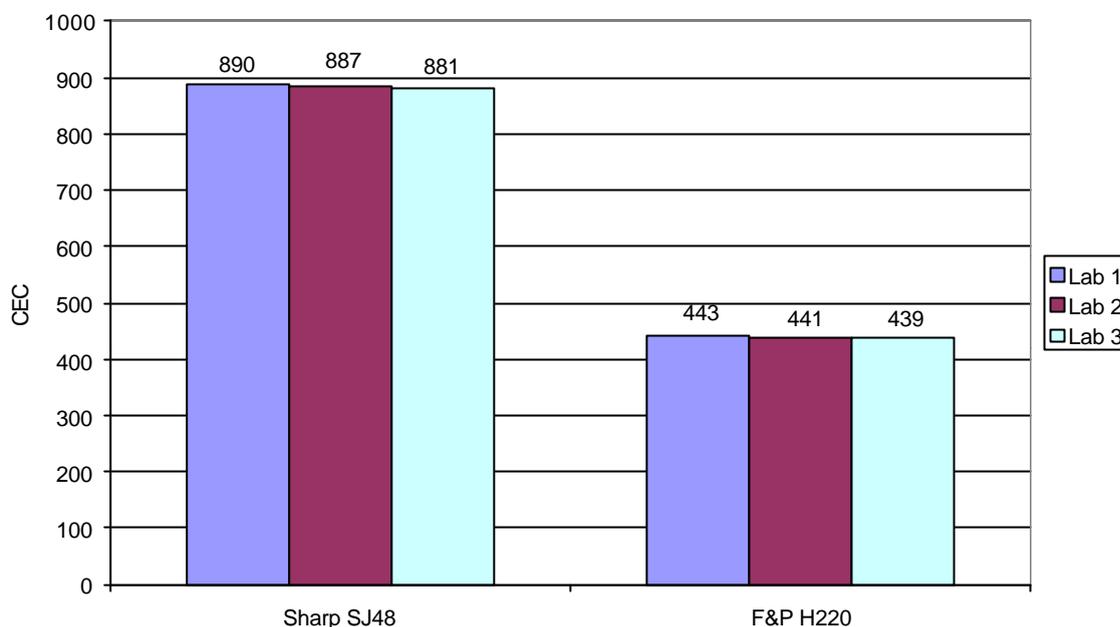
Two of the laboratories complied with the requirements of the current Standard as written. For one laboratory, the installation of the two units in the test room did not fully comply with the specified requirements of the Standard, namely Appendix B Clause B3.1 (d) (plywood backing panel), Appendix C Clause C2.3 (b) (ii) (mounted against the backing panel) and Appendix C Clause C3.1 (ambient temperature sensor). This lack of compliance, although of some concern, did not materially affect the outcome of the tests.

### ***What were the test results***

#### *Results*

The following charts detail the results from round robin tests conducted on the selected refrigerator and freezer units.

**Figure 1: Refrigerator Energy Consumption Results**



Note: Labs 1 to 3 for the Sharp unit do not correspond to Lab 1 to 3 for the F&P unit.

### *Analysis of Results*

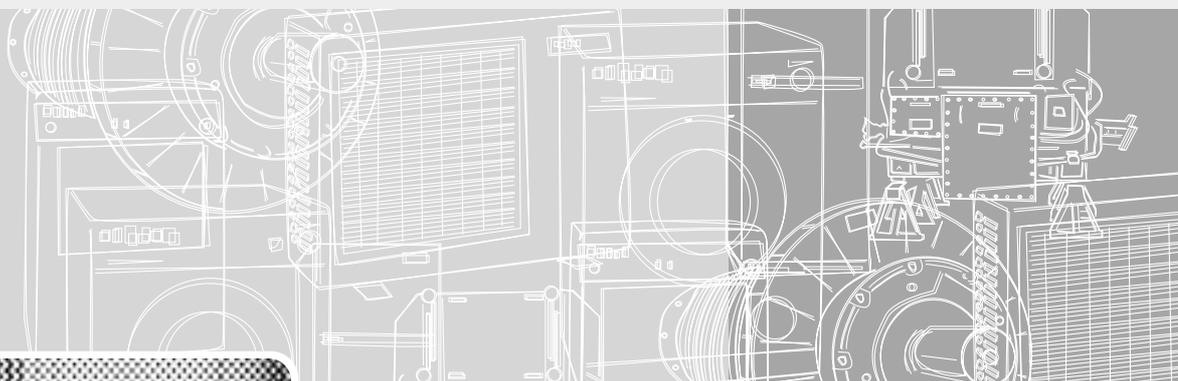
Energy consumption tests demonstrated acceptable levels of reproducibility within the order of  $\pm 0.5\%$ .

Detailed analysis of the test reports for the freezer showed that all laboratories used a single point on the warmest setting to determine energy consumption of the unit. All recorded an average freezer temperature of around  $-15.6^{\circ}\text{C}$  ( $\pm 0.2^{\circ}\text{C}$ ) on this setting.

### *Observations and Recommendations*

No further testing is recommended on this appliance group. No issues are noted for referral to the Standards Committee.





For more information contact:

Energy Efficiency Team  
Australian Greenhouse Office  
GPO Box 621  
CANBERRA ACT 2601

Facsimile: (02) 6274 1884  
Email: [energy.efficiency@greenhouse.gov.au](mailto:energy.efficiency@greenhouse.gov.au)

or any member organisation working  
on the National Appliance and Equipment  
Efficiency Program.