National Measurement Office

Enforcement Authority

EuP

Energy Labelling

Refrigerators & Freezers – Eco-design & Energy Labelling Compliance Project

October 2010

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Annex 1

INTRODUCTION

In April this year the NMO Enforcement Directorate undertook the first test programme project as part of the ecodesign enforcement work in the sector of domestic refrigerating appliances. Domestic refrigeration forms a large part of the household appliance market with most homes having at least one fridge or freezer or combination. As such any major branded refrigerating appliance that was sold displaying a label that understated the energy use of the product would result in a considerable extra energy cost to consumers as a whole and lead to an increase in CO_2 emissions. This makes the household refrigerator sector a high risk area and an ideal one to target as a first test project. The Energy Label Regulations cover the accuracy of claims on the energy label. These include: energy consumption, energy class and volume.

Before the project began we identified a suitable test house capable of making the required measurements to the desired level of accuracy and with the necessary accreditation. We identified Intertek as a test facility with the capability and necessary UKAS accreditation to act as external test house for this project. The Regulations require compliance testing to be carried out to a specific standard, in this case EN 153: 2006 Methods of measuring the energy consumption of electric mains operated household refrigerators, frozen food storage cabinets, food freezers and their combinations, together with associated characteristics. EN ISO 15502: 2005 / Cor 1: 2007 Household refrigerating appliances – Characteristics and test methods. These standards specify that first one appliance is tested and if it fails to meet any of the measured values by 15% for energy consumption and 3% for volume then a further three are tested. If the average of these results falls outside 10% for energy and 3% for volume then the product is considered legally non compliant.

RISK AND TEST PURCHASES

During the planning of this project we considered the risk indicators to ensure our sample of test appliances was not only a significant sample of the market but also to maximise the efficiency of the test programme by indentifying those products most likely to fail by considering factors such as probability of non-compliance and market penetration. Combining these factors provides an indication of the impact of non-compliance. Market intelligence was also used to identify probable possible non-compliance the main example being the Appliance L chest freezer, as we knew it to be subject to a legal case with trading standards. The other models were selected using risk based on factors such as energy labelling price comparisons and price comparison between freezers. This involved looking at refrigerating appliances that were relatively cheap while claiming high energy classes and comparing appliances that had similar volume and claimed to be the same energy class but with large differences in price. We also used information from consumer advice groups and internet research targeting only those claiming to be A or above as to check for compliance to the ERP minimum efficiencies.

We selected twelve different models covering a range of different types: Chest freezers as these were an area of high risk. A variety of larder fridges and fridge freezers as these have the largest market share and a large American style fridge freezer as these types use a large amount of energy. Appliances were purchased from a variety of major high street retailers as well as from online appliance stores. The appliances were delivered to the National Measurement Office and booked into our Evidence Handling Facility. They were each catalogued, identifying features and identification numbers recorded and the appliances fully photographed. The appliances were marked indelibly with an ID number and delivered to an external test house.

Table 1 –*Table showing brand and type of fridges selected for testing and the information supplied on the energy label. Volume is split into fresh/chilled & frozen.*

Brand	Type	Claimed Energy Consumption (KWH/Year)	Claimed Energy Class	Claimed Volume (l)	
Appliance A	Fridge Freezer	259	A	108	52
Appliance B	Undercounter Fridge	142	A	92	-
Appliance C	Undercounter Fridge	219	A	105	12
Appliance D	Fridge Freezer	256	A	115	55
Appliance E	Chest Freezer	152	A	-	102
Appliance F	Larder Fridge	151	A	130	-
Appliance G	Fridge Freezer	256	A	100	52
Appliance H	Fridge Freezer	219	A+	139	68
Appliance I	Larder Fridge	113	A+	130	-
Appliance J	Fridge Freezer	369	A	217	86
Appliance K	American Style Fridge Freezer	438	A+	335	180
Appliance L	Chest Freezer	263	A+	-	283

TESTING PROCESS

The appliances have to be tested in line with the most up to date harmonised standard as published in the official journal of the European Union (OJEC) or a specific standard cited in the Regulation. The test procedure for refrigerating appliances is outlined below.

The appliance is set up in the test room in accordance with the test standard and the manufacturer's instructions. Three thermocouples "slugged" with brass barrels are placed in the fresh food (fridge) compartment in prescribed positions which are broadly top, middle and bottom. A fridge is judged on the mean of the three thermocouple measurements which should be 5°C.

The frozen food storage compartment (freezer) is fully loaded with test packages made from a material (tylose) which present the same thermal properties as lean beef. These packages are about 3/4 water. Selected packs which are likely to be in the warmest places (seeking the weakest points) have thermocouple inserted to measure the freezer temperature. A freezer is judged on its warmest temperature which characteristically should be -18°C for a 3 or 4 star compartment.

To ascertain energy consumption the test room is set to achieve 25°C ambient, slightly higher than typical indoor temps in northern Europe to allow heat ingress to compensate for lack of door opening. After appliances have stabilised (which can take several days depending on the size and type) thermostats are set to achieve temperatures slightly warmer than +5 and -18 (warm run) and then thermostat are re-set to achieve temperatures slightly colder than +5 and -18 (cold run) in a new separate test run.

Test runs can be of 24, 48 or 72 hours approximate duration depending on the type of appliance. The two test runs are then interpolated to give energy consumption precisely at +5 / -18 as appropriate for the type of appliance.

Figure 1 & 2 – ***Photo showing fridge under test with thermocouples in place.***

Figure 2 - ***Photo of a freezer loaded with test packages and thermocouples in place.***

INITIAL RESULTS

Graph 1 – ***Shows the difference between the volume claimed on the label and the volume measured by external test house. The volume values are the sums of frozen, fresh and chilled storage volume where an appliance has multiple compartments.***

Graph 2 – ***Shows the difference between the energy consumption claimed on the label and the energy consumption measured by external test house. There is no value for measured energy consumption for Appliance L due to the appliance not meeting requirements for testing.***

Table 2 – ***Shows the difference between the energy consumption claimed on the label and the energy consumption measured by external test house. It also shows the percentage difference between the energy consumptions. Those sent for further testing are highlighted in red highlighted.***

Brand	Type	Claimed E. Consumption	Measured E. Consumption	Difference (%)	Vol % diff
Appliance A	Fridge Freezer	259	256	-1.16	-4.38
Appliance B	Undercounter Fridge	142	145	2.11	-4.35
Appliance C	Undercounter Fridge	219	172	-21.46	-3.42
Appliance D	Fridge Freezer	256	288	12.50	-5.29
Appliance E	Chest Freezer	152	350	130.26	0.00
Appliance F	Larder Fridge	151	144	-4.64	-3.85
Appliance G	Fridge Freezer	256	230	-10.16	0.00
Appliance H	Fridge Freezer	219	241	10.05	0.00
Appliance I	Larder Fridge	113	134	18.58	-4.62
Appliance J	Fridge Freezer	369	399	8.13	-1.65
Appliance K	American Style Fridge Freezer	438	435	-0.68	-5.24
Appliance L	Chest Freezer	263	NA	NA	0.00

From the initial set of results it was decided that four appliances warranted further testing. The Appliance E and Appliance I qualified for retest as their energy consumption was over the 15% tolerance. Appliance L failed to meet the correct temperature (-18) for the freezer testing and as such failed the test. The Appliance D fridge freezer was sent for further testing despite being below the tolerance for energy consumption as it was felt that there was a significant difference between both the volume and energy declaration. Appliance K was over the tolerance for volume declaration but it was felt that the initial testing was enough to begin enforcement contact with the company (see Annex 1). Although many of the other appliances were over the 3% margin for volume, the differences were so slight it was felt enforcement action was not necessary. For all items to be retested a further three appliances were bought from retailers randomly selected from online store. The follow up purchases were bought online as this allowed the process to be carried out quickly. All the appliances were catalogued and sent to the external test house.

FINAL RESULTS

Graph 3 – ***Shows the energy consumption claimed on the label compared with the average result for energy consumption on the four appliances sent for further testing.***

Graph 4 – ***This graph illustrates how the measured energy efficiency index (based on the measured energy consumption rates from the initial testing) compares with the limit on the index brought in by the ERP regulation on 1st July 2010. The dashed lines represent the limits for the 2012 & 2014 limits.***

ANALYSIS

The results of the further testing show that all four products were non compliant with all brands measured energy consumption. The differences between the declared and measured energy values are shown in the table below. The limit for compliant products is 10% on the second testing on the average energy consumption.

Table 3 – ***Table showing the percentage difference between measured and claim energy consumption levels.***

Brand	Type	%
Appliance L	Chest Freezer	18
Appliance E	Chest Freezer	126.1
Appliance I	Larder Fridge	10.91
Appliance D	Fridge Freezer	6.77

The largest non compliance incidence was Appliance E chest freezer which claimed to be an A rating and was measured at a G. The Appliance L from A+ was measured as a B and the Appliance I and Appliance D both claimed to be an energy class higher than they were measured at, A instead of A+ for Appliance I and B instead of A for Appliance D. Each of these products was then passed on to our enforcement teams and are currently undergoing enforcement action detailed in Annex1.

The study in volume shows that many companies are overstating the volume claim of their appliances, in most cases within the limit of the tolerences of the test procedure. However both Appliance D and Appliance K claimed volumes that were markedly outside of the allowed boundrys.

The graph on Energy index illustrates that most fridges have a measured energy index allowable under the ERP regulations (>55). Only three appliances had indecis over the limit, these included two appliances than had been non compliant with ELF, Appliance E and Appliance D, and Appliance J that had passed ELF testing.

CONCLUSION

The Project uncovered a large proportion of non compliance with regard to the ELF regulations in this sector with around 40% of appliances failing on either volume or energy consumption declaration. It was also found that many companies were overstating the capacity of their appliances with eight out of twelve appliances claiming higher than the measured value. Many of these claims were around the limit of the tolerances permissible under the labelling Regulations. This may suggest that industry may be exploiting this tolerance to claim higher volumes. Claiming a higher volume against energy consumption would give the appliance a better energy efficiency index and so could be used to artificially increase an appliance's energy efficiency.

Assessing these products against the ERP requirements from July this year and against future limits shows that the majority of products do comply with the current legislation. However all put one appliance would fail to meet the 2012 requirements and all would be above the required energy efficiency index for the 2014 limit. As such these products would need to be redesigned or removed from the market before these requirements came into effect. The only appliances that don't meet the current requirements are the Homeking the Norfrost and the LG model.

This project has raised various issues and highlighted some key areas of non compliance. It has highlighted the high risk associated with chest freezers as both brands of chest freezer failed to comply significantly. This will be fed into our test programme and may lead to a chest freezer project next year. Volume measurements have also identified as a high risk areas with discrepancies in the technique used to determine capacity and some variation in the understanding of different definitions of useable capacity. A project has been undertaken involving testing fridges solely for volume measurements both in house and out on shop floors of major retailers.

ANNEX 1

Enforcement Action Report

The Enforcement Team undertook four investigations following the test results of the project. This led to engagement with the relevant businesses, attempting to work with them towards ensuring future compliance and proportionate enforcement actions in light of the non-conformance. Below is a summary of the investigations undertaken, detailing the case and the outcomes reached.

Appliance D

Appliance D is a brand name of Brand A. Appliance D fridge/freezer test results indicated a smaller volume of usable space and a higher energy usage than declared on the energy label to a difference of 5.3% and 6.8% respectively.

Brand A discovered from their supplier in China that an error had been made in the test report from the accredited test house, also based in China. The information from their supplier had been used by Brand A without any further checking or verification of this data.

An immediate halt was placed on the sale of any further units with incorrect labelling. A Business Improvement Plan was produced including a new Supplier Management Policy. All distributors and retailers were contacted and provided with correct labels for units already in the distribution chain.

With the original declared energy consumption and volume measurements the consumer could expect the product to have a certain level of efficiency. If that same efficiency was maintained with the declared volume then each fridge/freezer would use 15kWh/year less energy. If this figure was multiplied by an expected product life of 7 years at 12-15 pence per unit of electricity then each product would cost £12.60-15.75 less to run. With 12,544 units of stock sold this equates to a consumer energy cost of between £160k-195k; roughly translating to 730-890 tonnes of CO_2 in the environment.

The resolution of this case was by Warning Letter. This was due to the company's immediate admission of the error and willingness to adjust procedures to increase the level of diligence in ensuring the data that is provided to consumers was correct.

Appliance I

The Appliance I refrigerator was tested to use more than the tolerance for energy efficiency at 11.1% over the declared energy consumption. This resulted in the A+ declaration being measured under older accredited tests to in fact be an A, an offence under the Energy Information Regulations but not under the Ecodesign Regulations, old or new.

When engaging with the company they demonstrated they had their own accredited testing carried out from a respected test house which had concluded that the product should be labelled A+. However, in light of the more recent results from the NMO, they agreed that energy labels would be amended to an A rating on any future products until sufficient evidence could show otherwise. A Business Improvement Plan was submitted to the Enforcement Authority to highlight the changes.

The yearly saving that could be inferred from corrections made to the energy labels based on 20,000 units being sold per annum and a 13kWh/year difference is around £220,000. This equates to around 1,000 tonnes of CO_2.

Ice King DM450A Chest Freezer- (Press Release) Appliance L

The NMO has completed an investigation into an offence relating to the mislabelling of chest freezers in relation to energy ratings. John Gillman & Sons (Electrical) Ltd, the company found to be supplying these products, were issued a formal caution after admitting to the offence.
In April 2010 the NMO initiated a project to assess the level of conformance across the refrigerator and freezer markets in accordance with the energy information and eco-design regulations.
As part of the programme an Ice King DM450 chest freezer (amongst other products) was purchased and subjected to testing to the terms of the harmonised standards. When this did not reach the required testing conditions three further DM450 freezers were sampled in accordance with the standards.

The freezers were declared to have an A+ energy efficiency rating, using 263kWh/year of energy according to the energy labels supplied. However, testing showed them to use an average of 310kWh/year, making the products B rated. This represents approximately an extra £40 in surplus energy costs for consumers over the lifespan of the chest freezer.

The Ice King brand is solely owned in the UK by John Gillman and Sons (Electrical) Ltd. The appliances were manufactured in China, with a Danish company acting as an intermediary in the supply chain. The Danish business took responsibility for testing, but despite this process the freezers failed accredited testing in the UK. No additional checks were carried out in the UK by the company.
On the NMO's first contact with the company the DM450 freezers were withdrawn from the market and held in quarantine. Over the following months the NMO and the company worked together towards compliance. No further DM450 models were sold and the business cancelled all further orders with their suppliers in Denmark and China, replacing them with new manufacturers of Ice King branded freezers.

Adrian Gillman, Managing Director of the company stated; "We consider ourselves a professional trading company being in business for over 40 years and have been horrified to experience that the product we have sourced hasn't been capable of meeting both the legal standards and those we specified."

The company has accepted their responsibility in this case and the impact that has been made on consumers and the environment. It has voluntarily arranged to pay for the work done by the accredited test house in establishing the energy use of the samples taken. This reflects the new legislative changes that will take full effect later in 2011, allowing the enforcement authority to reclaim testing costs should products fail to comply with an applicable implementing measure.
Director of enforcement at NMO, Richard Frewin added: "This company first came to the attention of the enforcement community in 2009 when they were prosecuted for mislabelling a freezer which had a much greater inaccuracy than discovered in this case. At the time the company took some steps to ensure that the problem

would not occur again and are very disappointed that another manufacturer has let them down. The company has ceased all trading with the manufacturer and now sources its product from a more reliable source. "The lesson to be gleaned from this company's experience is to check to ensure that the product being placed on the market in the UK is the same as the one against which the manufacturer is making energy efficiency claims and that poor manufacturing and transportation procedures do not impact on the quality and performance of the product over time."

Norfrost C4AEW Chest Freezer- (Press Release) Appliance E

The National Measurement Office (NMO) has completed an investigation into a serious offence relating to misleading energy labels displayed on freezers. Icetech Freezers Ltd, pleaded guilty to nine charges and were fined £12,000 and ordered to pay costs of £28,000.
Icetech Freezers Ltd is a company based in Caithness, Scotland, which manufactures chest freezers. They were formed in 2005 when the previous company trading from these premises, Norfrost Ltd, was purchased from administrators. Icetech kept the Norfrost brand name for use on its chest freezers.

In April 2010 the NMO initiated a project to assess the level of conformance across the refrigerator and freezer markets in accordance with the energy information and eco-design regulations. As part of this project, numerous products from various companies including the Norfrost C4AEW were subjected to accredited testing to determine the accuracy of the energy declarations made by manufacturers. The results of the testing showed the chest freezer was rated as an F (343kWh/year) for energy efficiency when it was labelled as an A (152kWh/year). This difference equated to consumers paying between £160 and £200 in extra energy costs over the lifetime of the product, based on the standard testing cycle.

The NMO acted quickly to contact the company and an Enforcement Notice was issued, preventing further sale of products displaying misleading energy labels.
In the months between discovery of the test results and the completion of the investigation the company worked with the NMO towards ensuring compliant products were placed on the market. New suppliers and components have been sourced, production improved and internal testing facilities developed to ensure the description of the freezer reflects its performance. They have also implemented a scheme to assist any consumers unhappy with their purchase of an under-performing C4AEW.

David Morrill, Managing Director of Icetech Freezers Ltd stated;
"Icetech Freezers and its management team have taken this situation as a positive opportunity and used it to improve the performance and quality of the products they produce. On the advice of the NMO a complete reassessment of production and testing procedures has been completed in order to ensure production and performance consistency across the entire product range. Going forward Icetech Freezers fully intends to continue its working relationship with the NMO."

The company has accepted their responsibility in this case and the impact that has been made on consumers and the environment. Despite the detriment, they have shown commitment to improving their product rapidly to ensure consumers can rely on the accuracy of the information about energy consumption. NMO and Icetech will continue to work together to monitor the quality and consistency of the product into the future.

Richard Frewin, Director of Enforcement at NMO said;
"The court has clearly recognised the importance of providing consumers with accurate information about the energy consumption of appliances. It is a key part of the drive to create more efficient and innovative products in our homes which will ultimately lead to a reduction in CO_2 emissions."