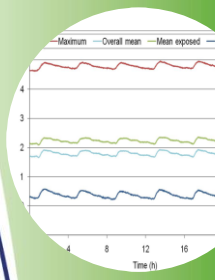
Refrigeration Developments and Testing Ltd

RD&T Case Study

Optimising performance of an integral retail display cabinet

Company: PureCold



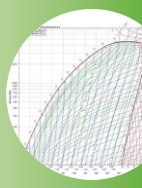
Background

End users of retail display cabinets commonly aim to ensure that their products comply with temperature and energy standards. It is usual for chilled retail display cabinet to conform to temperature classifications defined in the current test standards; EN23953. These are most commonly either M1 (all measurement test packs equal to or above -1°C and equal to below 5°C) or M2 (all measurement test packs equal to or above -1°C and equal to below 5°C). The energy consumed by the cabinet is also measured as part of the EN23953 test. In the UK the energy consumed is usually required to be below a level defined in the UK ECA (Enhances Capital Allowance) scheme. If the cabinet complies with both the temperature and energy requirements of the ECA scheme manufactures can list their product on a Government energy saving database and end users can claim a tax allowance when purchasing the cabinet.

When the MD of PureCold, Mark Isaacs, wanted to get his multi-deck cabinet listed under the ECA scheme he sent the cabinet to RD&T for testing. Initially we found that the cabinet performed quite well and was able to achieve the M2 classification. However, we found that the energy consumption was too high for the cabinet to be listed under the ECA scheme. Ideally PureCold wanted the cabinet to perform to the M1 temperature classification and so we were given the target of improving the temperature performance and at the same time reducing energy consumption.

Testing work

The cabinet refrigeration system was initially optimised. Ideally PureCold did not want to make any major changes to the refrigeration circuit but they were happy to change the refrigerant that the cabinet operated on to a hydrocarbon (R1270). Once this had been achieved the refrigerant charge and length of the capillary expansion tube were optimised. To do this temperature sensors and pressure transducers were placed at critical points on the refrigeration circuit. The cabinet capillary expansion tube and refrigerant charge were then altered to provide the correct evaporating temperature for the minimal refrigerant charge.



At this point the cabinet was placed in an EN23953 test facility and tested according to the EN23953 test standard. Further optimisation work was carried out to improve air flows within the cabinet before a final test of temperature and energy consumption was carried out.

Results

The work carried out on the cabinet enabled the cabinet to be able to achieve the M1 temperature classification. Due to the optimisation work the energy consumed was reduced below the value achieved in the original M2 classification test.

	Before	After
Temperature classification	M2	M1
TEC/TDA (kWh/24h/m^2)	10.91	9.57
ECA threshold (kWh/24h/m^2)	10.55	11.95
	FAIL	**PASS**

Refrigeration Developments and Testing, Churchill Building,
Langford, Bristol, BS40 5DU
Tel: +44(0)117 928 9239 Fax: +44(0)117 928 9314
Email: rdandt@rdandt.co.uk

www.rdandt.co.uk
www.purecold.co.uk