



SUPERMARKET COLD STORE PRODUCT SOLUTION

AIR CURTAINS FOR SUPERMARKET COLD STORES

Every supermarket uses positive or negative temperature cold storage rooms to store fresh and frozen products. Due to accessibility and ensuring products are fresh on the shelves, chillers and frozen food areas they will be refilled regularly, which means the cold storage rooms need to be accessed a large number of times in a day.

Biddle



THE CHALLENGES TO OVERCOME

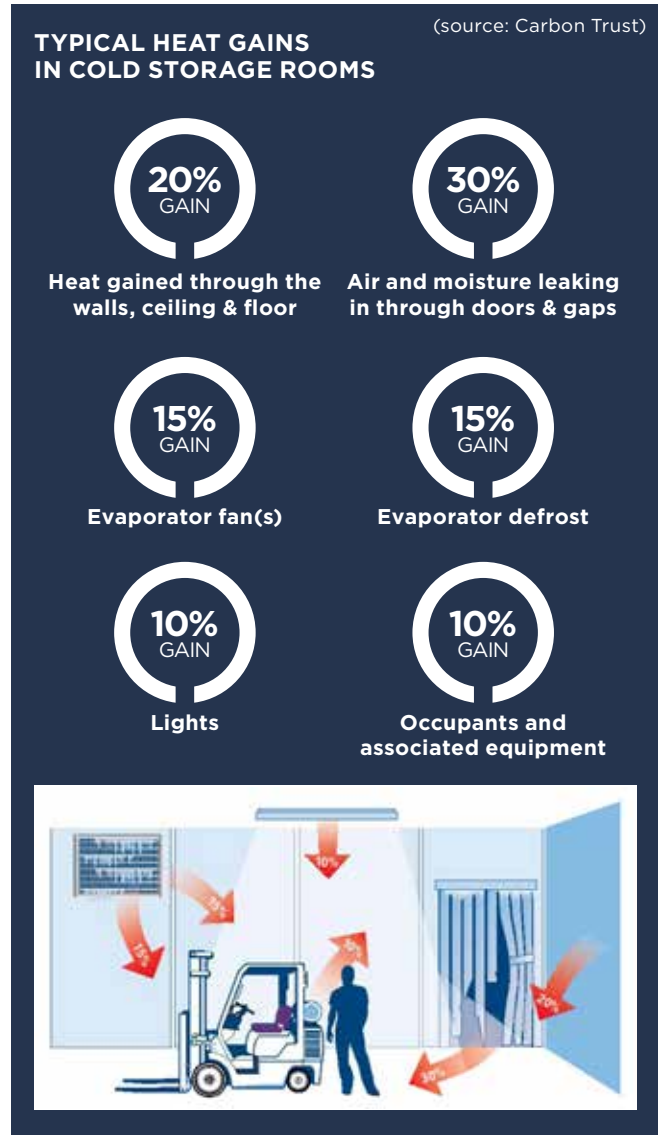
Moving between the warehouse and the temperature controlled storage rooms and chillers poses a number of challenges for the managers and operators when doors need to be opened and shut regularly through the day.

- Overconsumption of energy as the losses of cold air through the doors can amount to 30% of the total energy consumption of the cold storage room
- Potential product loss, due to the triggering of temperature monitoring alarms which could cause products to perish
- Ice build-up on the doors, packages, evaporators and walls, requiring frequent cleaning



These events often lead to work by maintenance service providers, downtime and of course additional costs.

Every time the door of a cold storage room is opened, convection occurs: due to the difference of density, the cold air inside the room escapes at floor level while the warm humid air enters the room in the upper part of the opening. For a standard opening, the instant heat gain amounts to approximately 90 kW per door, for an installed capacity of 5 to 10 kW. A temperature rise then inevitably occurs, leading to significant risks for the quality of stored products or goods.



ANALYSING THE EFFECTIVE MANAGEMENT OF COLD STORE OPENINGS



Biddle has implemented a certain number of solutions to analyse and quantify the losses that occur every time a door is opened:

- A simulation with Doorloss, a software program developed by Biddle, has made it possible to estimate the amount of losses by convection. Considering the sensible and latent heat, the losses are estimated to be 90 kW.
- A thermographic analysis of a screen placed in the opening reveals the air movements which occur every time the door is opened. Whether an air curtain is installed or not, the cold air leaks out through the lower part of the opening.

PRODUCT SOLUTION

ADVANTAGES OF CLIMATE SEPARATION

When air curtains are installed above the doors of small cold storage rooms in supermarkets the losses are reduced by 80%, which helps operators reduce their maintenance and energy expenses and improves the preservation of perishable food stuff and products.

The DoorFlow air curtain is equipped with a rectifier, a technology which increases the length of the stream by 40% (as determined by the TNO research centre). It generates a straight, convergent air stream along the opening, in order to eliminate the convection.

The air curtain starts upon door opening and features a time delay.

The measurements performed on site made it possible to determine the most suitable flow and air stream length for this application.

The air curtains are pre-wired at the factory, for easier installation.

However, they can be supplied with a 3-position control unit.

Once connected to the door switch, the operation of the air curtain is automatic.

Thermographic analysis shows that there are no more losses with the air curtain.

- The temperature rise within the room is 4 times slower: from -22°C to -18°C in 2 min 40 sec instead of 40 seconds without the air curtain (store at 20°C)
- Operators report that the cold rooms need to be cleaned 5 times less frequently
- On the various sites assessed with distribution partners, the number of temperature alarms dropped by 66%



An example of the calculations for the return on investment based on only 1 hour of door opening per day.

Opening 1 h/day	Without air curtain	With air curtain
Cold room consumption	36,000 kWh	30,000 kWh
Room consumption	0 kWh	150 kWh
Price per kWh	0.1€	0.1€
Annual consumption	3,600.00€	3,015.00€

The payback for many grocery distribution companies is often less than one year, thanks to the reduced consumption and maintenance costs.

Year	Equipment & installation	Energy saving	Maintenance saving	Cost of use
n	3,500€	585€	500€	2,415€
n+1		585€	500€	1,408€
n+2		585€	500€	401€
n+3		585€	500€	-606€
n+3		585€	500€	-1,613€



KEY ADVANTAGES:

- Reduced energy consumption
- Temperatures kept constant
- Reduced ingress of moisture
- Easy installation
- Automatic operation



OUR SOLUTION

The DoorFlow air curtain provides a solution which ensures temperatures are kept constant in each area and there is a reduced ingress of moisture. Energy is not wasted through the introduction of the air curtain and the payback for the investment is less than 12 months. Retail customers in France, Spain and Italy have already experienced the benefits of the solution, making significant savings which they continue to roll out across their supermarket chains across the rest of Europe.



ABOUT BIDDLE

Biddle is a world leader of climate separation technologies for use at the entrances of cold rooms and commercial, public or industrial buildings. Biddle has developed, in collaboration with many Universities and Research Centres, exclusive technologies to preserve the indoor temperatures and save as much energy as possible. Biddle equips the cold storage rooms of most major logistics companies and agrifood suppliers, as well as the logistic bases of players of the modern grocery distribution sector.

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