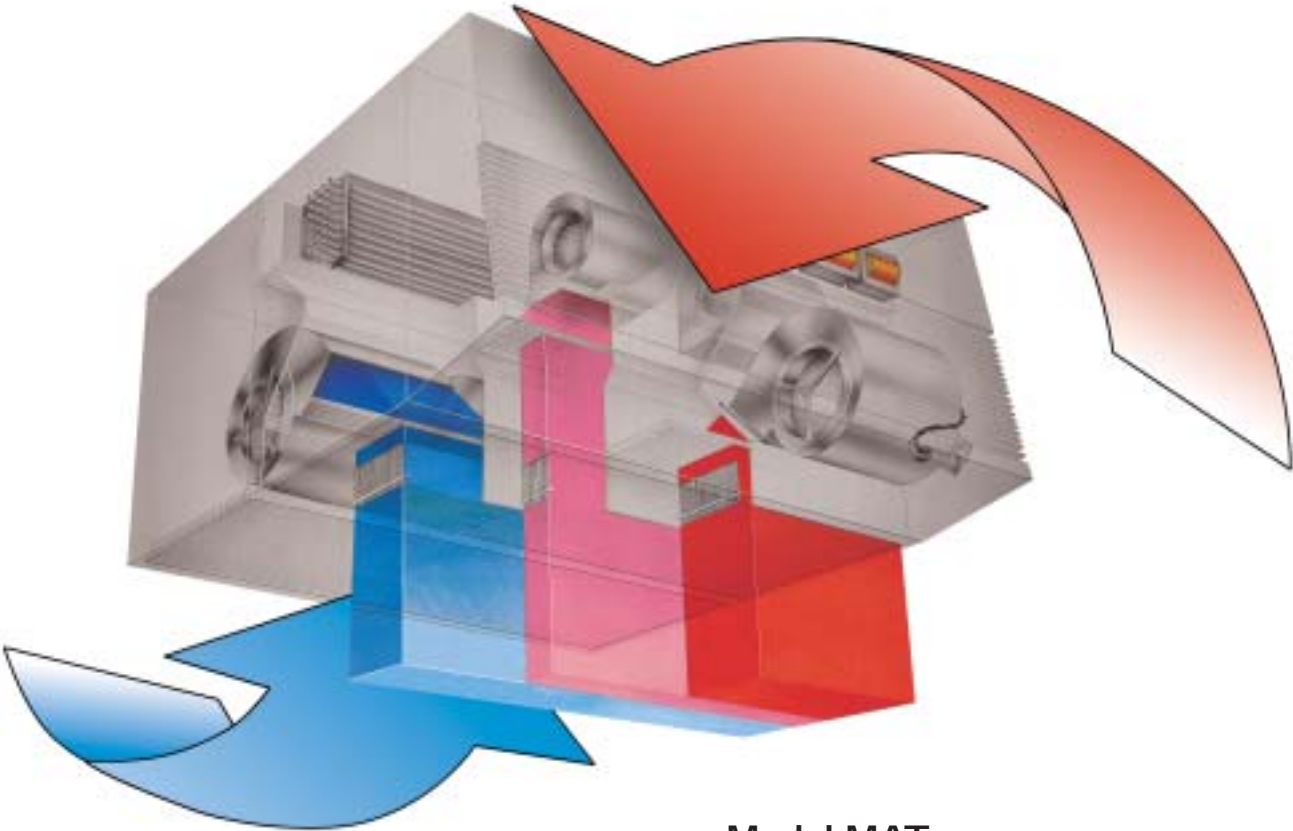


Cold Store Air Curtains



Model MAT

Free access to cold store



Broken plastic strips do not screen off the doorway properly.



Icing-up leads to dangerous situations.

Cold stores are used for storage purposes and must be easily accessible for a transportation point of view. A separation between the cold store and the front hall is necessary to keep the temperature in the cold store constant. Without such separation, cold air will flow out of the cold store, while warm air will penetrate into the cold store. This will lead to energy loss. In addition, mist and ice will form in the cold store, because warm, humid air from the front hall mixes with cold, dry air in the store.

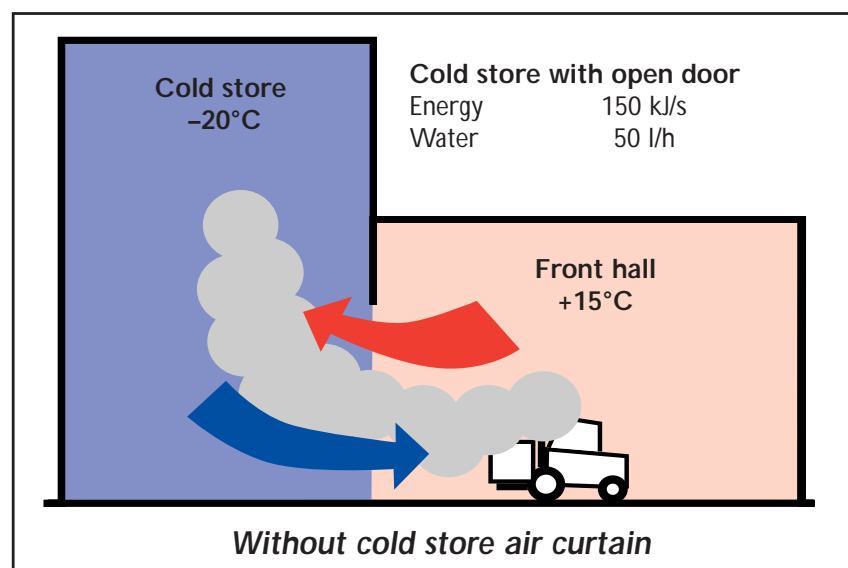
Constant temperature

The government is taking more and more measures to assure the quality of food. Within that scope, European HACCP guidelines have been drawn up. These prescribe temperature maintenance during the entire process of conditioned storage. This means that the temperature in a cold store must remain constantly low. With an open door, this cannot be done.

Misting and icing-up

Misting and icing-up require a high degree of maintenance and risk for staff. Misting causes poor visibility, so that fork lift truck drivers have difficulty in avoiding collisions. Icing-up also leads to an increased risk of accidents. In addition, icing means that the cold store and the cooling equipment require additional maintenance.

When air from cold store and front hall start to mix, misting and icing-up will occur.



Cold store door poses an obstacle

A cold store door screens off the doorway, but it also poses an obstacle to transport. Plastic strips and fast action doors make it possible to expedite transport, offering some degree of screening. Disadvantages of these solutions are that they do not offer continuous screening and that they lead to risks for forklift truck drivers. They also produce a logistics problem with opening of doors.

No continuous screening

Screening the doorway reduces the mixing of air from the cold store with that from the front hall, as long as such screening is actually functioning. Every time the doorway is made use of, screening ceases to exist. As a result, energy is lost, and misting and icing-up will occur.

Obstacles to transport

Keeping the door closed until the last instant carries the risk of collisions for forklift truck drivers, because they do not see obstacles or persons on the other side until the very last moment. In addition, opening and closing doors hinder their logistical activities.



Plastic strips pose an obstacle to transport.

Biddle cold store air curtain

To realise free access, guarantee a constant temperature, and radically reduce misting and icing-up, Biddle has developed the cold store air curtain.

This air curtain is based on the Multi Air stream Technology (MAT) of Biddle.



Cornelis Vrolijk's Visserij, IJmuiden (NL)

Safer for staff

Due to the excellent climate separation, a low degree of condensation occurs, so that little ice is deposited against walls, floors, ceilings and the cooling plant. This reduces the risk of slipping by a considerable amount. In addition, drivers of forklift trucks have an unobstructed view due to the air curtain. Other forklift trucks or obstacles within the cold store are visible immediately. Not only does this increase the comfort and safety of staff, it also avoids unnecessary expenses being incurred due to damage.

Faster loading and unloading

With a cold store air curtain, the door can remain open, so that transport can perform its function more efficiently and therefore lead to logistical cost savings.

Less maintenance

Because less ice is deposited, maintenance on cold stores and cooling equipment is minimised. An additional advantage is that the cold store will have to be put out of operation less often, enabling a higher degree of capacity utilisation.



Pomona, Mions (F)



Hygiene

A cold store air curtain creates a contact-free screening of the doorway. It also keeps the temperature in the cold store constant. Within the framework of the HACCP guidelines, the MAT cold store air curtain thus adds value to cold store hygiene. The air curtain is made of stainless steel.

Savings

Use of a cold store air curtain may yield energy savings of up to 80% compared with an open door. Although the costs of purchasing an air curtain are 2 to 3 times higher than a conventional (quick-closing) door, the operating costs will be considerably lower. In some situations, a cold store air curtain will start to pay for itself within two years.

References

McCain: McCain produces various products, such as the well-known 1-2-3 fries. The cold store is in operation for 6 days a week, 24 hours a day. The cold store air curtain prevents energy exchange over the doorway and moisture from penetrating.

Sinnack: This producer of bakery products, such as pre-baked rolls and baguettes, makes use of Biddle cold store air curtains. The air curtains are used to increase the safety of the staff members.

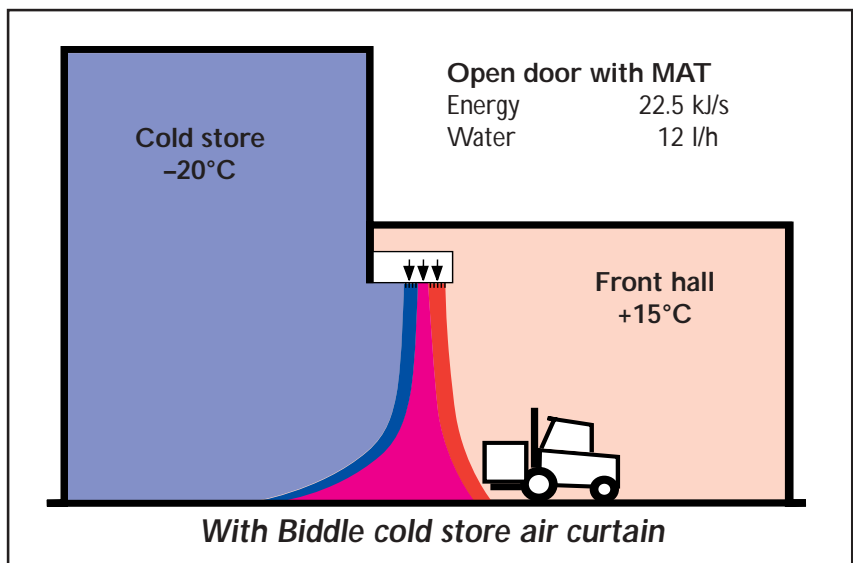
Birds Eye Wall's: This producer of ice cream uses the MAT cold store air curtain as an integral part of its fast track product handling system.

Heiploeg: Heiploeg is the largest shrimp trader of Europe. The major benefit of the cold store air curtain is that fork-lift trucks can freely move back and forth in a safe way, so another 40 to 60 pallets can be processed per day.



Heiploeg, Zoutkamp (NL)

The cold store air curtain realises an excellent climate separation, so that minimal misting occurs.



Multi Air stream Technology



Control panel

The technology that forms the basis for the cold store air curtain is called “MAT”: Multi Air stream Technology. By producing three air streams, the cold store air curtain creates a screen between the cold store and the front hall. The air curtain draws air from both the cold store and the front hall, discharging both cold and warm air into the doorway. For such an air curtain to be created, two phenomena have to be prevented: turbulence and condensation.

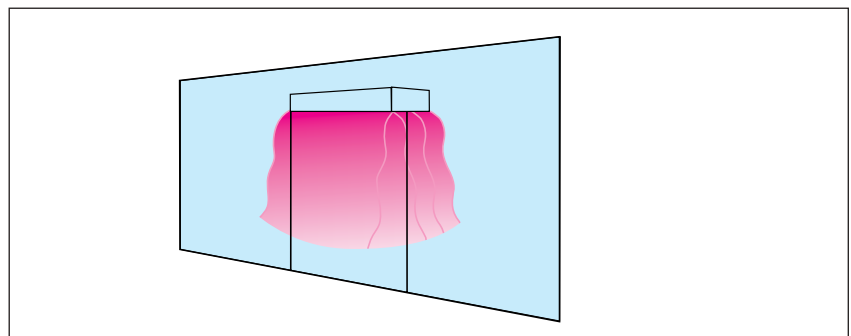
Prevention of turbulence

Rectified streams

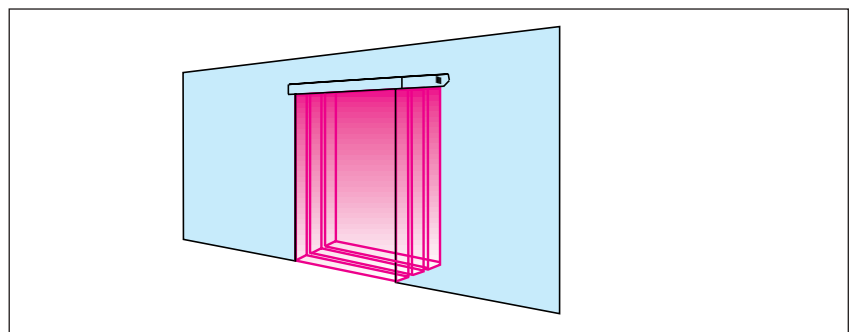
When air is discharged, it tends to diverge. This must be prevented, otherwise the three air streams would mix after all, and fail to reach the floor. The MAT cold store air curtain is provided with patented rectifier technology. Biddle has been applying this patented rectifier to its air curtains for some considerable time now. The special design of the discharge grille makes it difficult for the discharged air to diverge. The rectifier smoothes any turbulence generated by the fans, discharging the air in three straight, concentrated streams. The outlet velocity can – and must – remain low, because the higher the outlet velocity, the greater the turbulence will be. As a result, the cold store air curtain will not lose energy unnecessarily due to divergence, and the streams will not mix.

Equal velocities

Not only are the air streams straightened, but all three also have the same outlet velocity. This guarantees that the different air streams will not mix and that they all will reach floor level.

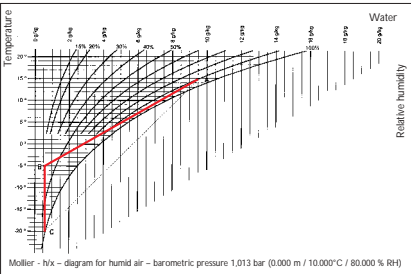
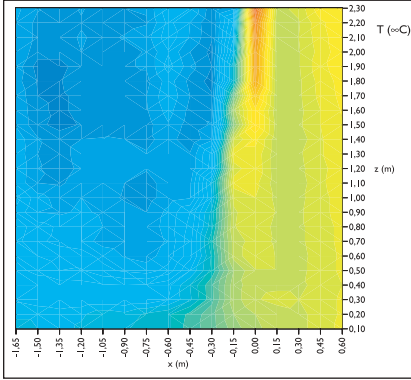


Air curtain without rectifier, so the air will diverge. Energy loss and draft will occur as a consequence.



Air curtain with Biddle rectifier. The three air streams are blown out straightened and have the same low outlet velocity.

Prevention of condensation



Mollier-diagram

The outer two air streams are quite different in terms of temperature and absolute humidity (streams A and C). This leads to condensation (misting) where the streams meet, as appears from the black dotted line in the Mollier diagram. To prevent condensation, a middle stream is added (stream B).

This stream is also taken in from the cold store, and heated to reach a higher temperature. The relative humidity of the middle stream is low, so it can take in moisture from the hot 'front hall area stream' (A). The dry 'cold store stream' and the humid 'front hall stream' do not intermix, nor does any misting arise (see red line in Mollier diagram). The discharge temperature of the middle stream (B) can be automatically controlled. At higher temperatures in the ambient area (see fig. 1), a higher discharge temperature is needed to prevent misting, contrary to fig. 2, where the front hall has a lower temperature. The temperature in the front hall is read and the discharge temperature of the middle stream (B) is exactly controlled using several sensors, so misting is prevented. This allows you to keep the air curtain's electrical capacity as low as possible in all circumstances (thus saving on energy), and yet warrant a mist-free passage.

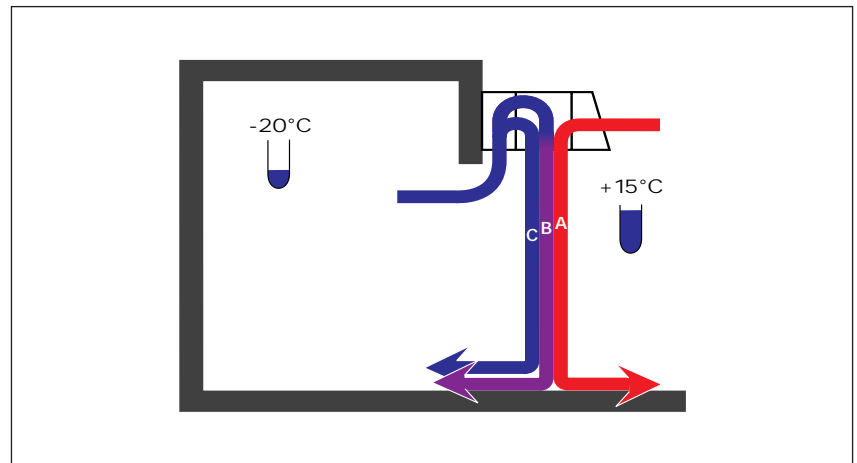


Fig. 1 At higher temperatures in the front hall (in the summer), stream B has a higher discharge temperature to prevent misting.

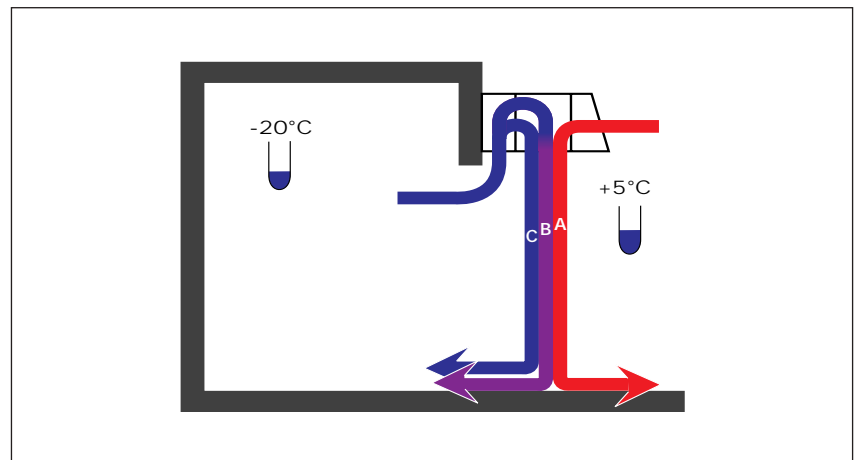


Fig. 2 At lower temperatures in the front hall (in the winter), the discharge temperature of stream B adjusts automatically to such lower temperature as is exactly needed to prevent misting.

Full-scale services



Rewe, Neudietendorf (D)

Investing in a cold store air curtain is not straight forward – it begins with a comprehensive site inspection process and after the order, Biddle remains closely involved in the project. One of Biddle's advisers will visit the client to inspect the situation on site. If a Biddle air curtain turns out to be an appropriate solution, Biddle will submit a quotation and, if necessary, make recommendations for making constructional alterations. On request, Biddle can maintain contact with third parties, such as insulation specialists, electricians and contractors. Biddle can then supervise the planning and report to the client. The final installation and commissioning of the unit are carried out by Biddle under its own management.

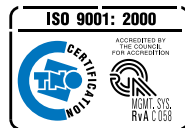


Van den Broeke-Lutosa,
Leuze-en-Hainaut (B)

Leading innovators

Investing in continuous innovation is one of the most important elements of Biddle's policy. In doing so, Biddle does not confine itself to the expertise of its own organisation. It also works together closely with, in particular, TNO, which is a leading Dutch research institute, but also with technical universities. TNO has been closely involved in the development and testing of the cold store air curtain.

Technical data available on request.
Subject to change.



Biddle bv
P.O. Box 15
NL-9288 ZG Kootstertille
The Netherlands
tel. +31 512 33 55 55
fax +31 512 33 55 54
e-mail export@biddle.nl
internet www.biddle.info

Biddle Air Curtains
St. Mary's Road, Nuneaton
Warwickshire CV 11 5AU
United Kingdom
tel. +44 2476 384233
fax +44 2476 373621
e-mail sales@biddle-air.co.uk
internet www.biddle-air.com