Technical Information Paper

TIP-409

Adaptable Building Solutions

CA | GROUP

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The demand for large-scale warehousing has doubled in the last ten years[1] in particular, the need for temperature-controlled space has increased with growth in the retail sector, which currently accounts for 35% of warehousing stock in the UK[2]. An increase in online commerce has meant the fast-moving consumer goods (FMCG) market has evolved and there is much greater focus on supply chain support services, as well as storage. These market factors are some of the reasons why the demand for large distribution centres have become increasingly complex, with building requirements evolving to not only focus on the external building structure but to place equal emphasis on the quality and control of the internal storage space. Buildings servicing retail and food enterprises now need to efficiently manage / maintain a range of temperature and climatically controlled spaces, with sophisticated M&E equipment.

[1] Online Shopping Drives Demand For Warehousing Space, BBC News online, 27th August 2018
[2] The Size and Make Up of the UK Warehousing Sector UKWA

Over recent years, Developers have requested cold store and chill store specifications with little understanding of requirements for the building and its envelope, simply by specifying a 'box-within-a-box'. There are three categories of temperature-controlled storage; 'ambient', 'cold', and, more recently, 'chill' store:

i. 'Ambient' storage space is essentially unconditioned and provides 'room temperature' and normal storage conditions, typically only constructed with frost protection, maintaining an internal temperature around 15°C. It is often required for a range of commercial sectors, including industrial, manufacturing, logistics, retail (non-perishable food and non-foods). With regards to the building envelope, there are no special requirements for temperature control. This is how many buildings have traditionally been constructed and is widely used in commercial space.

Image 1 - Example of an 'Ambient' warehouse during fit-out

ii. 'Cold' storage space is designed to respond to a need for temperature-controlled space within a building that requires either ambient, cooled, sub-zero or a combination of temperature-controlled zones within a building. This space is typically demanded by the retail, pharmaceutical, leisure and logistics sectors. It is achieved through the construction of a secondary build inside the building; effectively creating an internal 'box' that is typically used as a refrigeration unit or freezer for the storage and control of perishable goods, commonly called a 'box-within-a-box'. This solution has been widely adopted in the construction industry. Temperatures for this type of storage are typically sub-zero.

Image 2 - Example building with an internal 'Cold Store', visible through the glazing

iii. 'Chill' storage is a relatively new concept of an internal environment. Chill stores can cater for temperature ranges typically between +1°C, and +8°C. The advantage a chill store has is that the entire internal environment can be temperature-controlled, without the need for an additional internal 'box'. This would typically be required for foodstuffs, for example, fresh produce, as well as horticultural, agricultural and pharmaceutical supplies.

Image 3 - Example of a 'Chill store' prior to fit out.

The Building Envelope

As specialists in building envelope design, development and installation, CA Group recently embarked on planned evolution of the Twin-Therm® systems to create a more economical, environmentally efficient, and flexible building envelope system that offers a 'next generation' of temperature-controlled storage buildings. The aim: to provide a building envelope system specially designed to deliver multi-temperature controlled internal spaces that are more viable and commercially attractive to property developers, as well as delivering improved environmental benefits.

Typical ambient buildings and cold stores both require standard construction methods, built in accordance with the need of the Client, Developer, Building Regulations and Local Authority Building Control (LABC) requirements; as standard, Twin-Therm® meets all these specifications. Continuous investment in product design, development and installation have enabled the company to create a system that goes beyond this, offering dynamic and 'Adaptable Building Solutions'[3], for internal temperature applications as low as 0°C.

[3] 'Designing for Adaptability' article, June 2019 (https://issuu.com/lapthornmedia/docs/ap_719/96)

The need to design for adaptability is fundamental in being able to attract a diverse range of prospective occupiers and allow flexibility to change to suit the needs of the existing tenant, which over time can increase retention. Buildings that can offer ease of conversion and be adapted readily provide enhanced opportunities for the Developer, i.e. there is less limitation and reliance on certain types of occupants, instead much greater scope and therefore potential demand.

Recognising the need to better meet the demands of the marketplace, CA Group began a process of research and development to better understand the impact of the external envelope on internal temperature-controlled buildings. The aim was to provide a robust solution that would meet with the strict performance requirements of a chill store building, with internal temperatures as low as 0°C, whilst delivering a high quality, technically advanced and simplified construction solution. In particular, due consideration was given to the implications on twin-skin cladding systems and the management of condensation within the construction - an area fraught with complications.

Condensation Management

To develop the new generation of our patent protected adaptable building solution Twin-Therm® Chronus® Ready & Twin-Therm® Chronus® specifications, CA Group needed to overcome the key challenges concerning condensation management and devise a solution that would not only reach performance requirements, but that would also offer flexible building adaptability. Firstly, through one of the UK's independent leading authorities in condensation, we assessed the impact of the internal environment change and its effect on the standard Twin-Therm® roof and wall cladding system, the key outcomes provided below.

The condensation drive within the construction for typical buildings (calculated to British & European Standards, with 0°C external and 20°C internal temperatures) is to the underside of the external sheet as shown in Image 4.

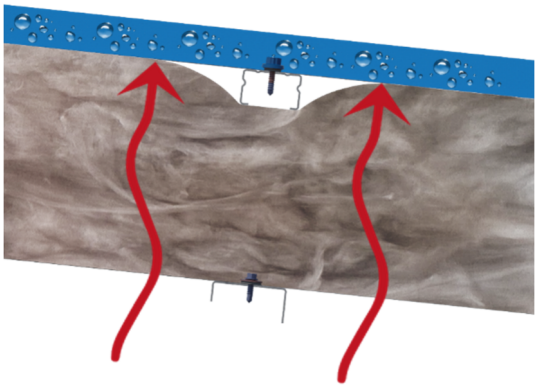

Image 4 - Normal Condensation Drive

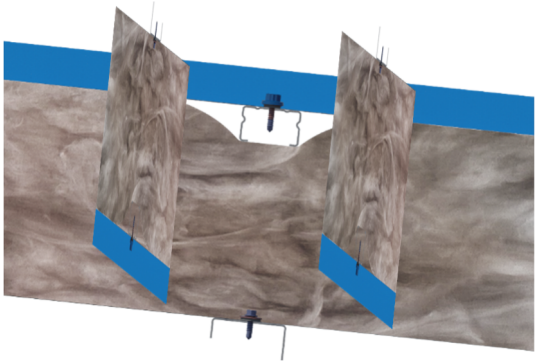

Image 5 - Reversed Condensation Drive

When the internal environment is a 'Chill store' however, the condensation drive is reversed as seen in Image 5, resulting in condensation forming on the outside face (or the cavity face) of the liner panel and therefore must be controlled.

Twin-Therm® Chronus® Ready and Twin-Therm® Chronus® (or Chronus® Ready and Chronus®) engineered systems evolved following completion of the programme of development, testing and certification, working with specialists in the field to determine the exact specification required to achieve a robust, but adaptable, building solution to meet with multi-temperature requirements.

Twin-Therm® - The Benefits

Chronus® Ready and Chronus® present a 'first' and 'unique' solution to Developers and overcomes many of the associated challenges, risks and costs of alternative solutions; new build, extension or costly building modification, which can impact on business continuity and require additional investment.

Space is maximised without the need for implementing a secondary build internally, therefore reducing build costs and freeing up internal space, further optimising storage.

Both systems minimise the need for expensive off-site storage solutions or the installation of additional facilities.

Build time is reduced, as there is no need to build an internal 'box' and so handover can be achieved far earlier.

Adaptable Building Solutions can increase site capacity, provide greater flexibility for internal layout planning, and offer greater freedom of movement for the packing, picking and transfer of products around the building.

As the building is more readily converted, there is wider sector suitability, thus providing Developers with an 'Adaptable Building Solution' that can broaden the market appeal of their property.

This combination of building materials and its component parts are exclusive to CA Group. The installation of which is carefully controlled and managed by CA Group and the company's trained installers to maintain quality and system integrity and without compromising building envelope performance and associated building guarantees.

At the time of publication, CA Group is unaware of any other system that can achieve this performance with the benefit of a simplified construction process. Chronus® Ready and Chronus® systems offer a highly appropriate and exclusive solution for the warehousing market, bringing with it the additional benefits to both the Developer and the end-user in terms of construction cost savings, operational cost savings and a reduced carbon footprint.

For further assistance, contact CA Group Technical Department with regards to your 'Adaptable Building Solution' specification.

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