THIS IS NOT A UNITISED FACADE

CPD MODULE: INTRODUCTION TO UNITISED CURTAIN WALLING

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INTRODUCTION

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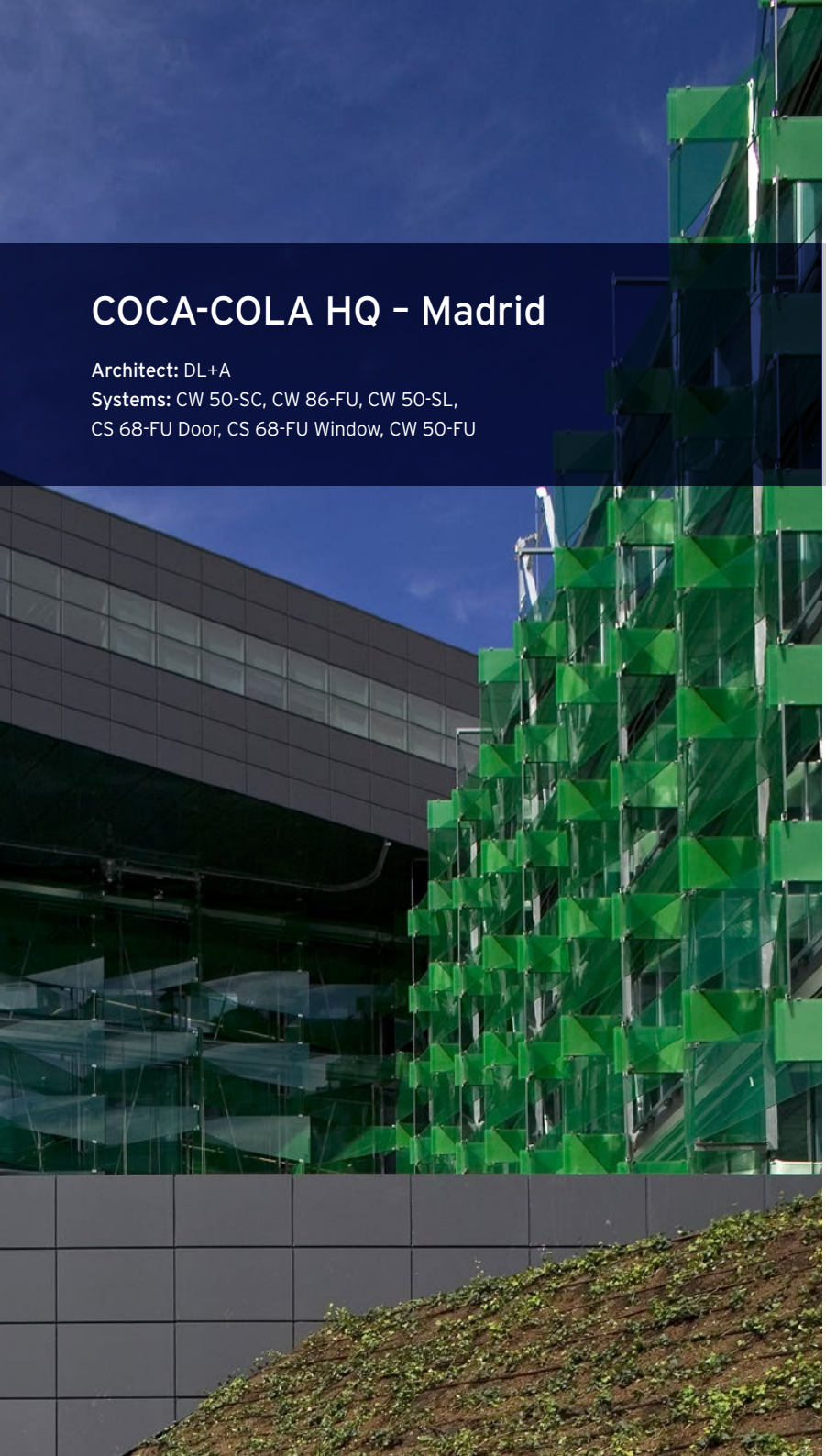
Curtain walling is a building envelope that is intended to support only its own weight and withstand the effects of environmental forces such as wind. It is not intended to assist the structural integrity of the building. There are two main types of curtain walling construction: "stick" and "unitised".

In stick construction, the curtain wall frame is constructed mainly on site with mullions and transoms supporting glass, spandrel panels, metal panels and brise-soleils, connected piece by piece. Each mullion is usually supported by the floor or perimeter beams.

In unitised construction, on the other hand, the curtain wall is composed of large units that are assembled in the factory, shipped to the site and erected on the building. Aluminium profiles are used to form the frame, which is normally one-storey high. Opening vents, glazing and infill panels are built into units before being transported to site. As with stick construction, each unit is usually supported by the floor or perimeter beams.

HOFTADORG - Iceland

Architect: PK Arkitektar, Reykjavik & LWW, Berlin
System: CW 86-EF Bespoke Solution, CW 50-SC



COCA-COLA HQ – Madrid

Architect: DL+A
Systems: CW 50-SC, CW 86-FU, CW 50-SL, CS 68-FU Door, CS 68-FU Window, CW 50-FU

KEY ELEMENTS CURTAIN WALLING SYSTEMS

STICK CURTAIN WALLING
Stick curtain walling systems are versatile and allow for the integration of other systems, such as sliding doors and windows. They tend to be less specialised and can be built by all types of fabricators as they are not dependent on having a large factory.

However, stick systems do require multiple steps to erect and seal the wall, which means more time is spent on site – an approximate rule of thumb would be that 70% of the work is carried out on site, with 30% in the factory. This incurs further costs, such as labourers' time.

UNITISED CURTAIN WALLING
For unitised curtain walling, about 30% of the work is done on site, while 70% is carried out in the factory. The complete assembly of the units in the factory brings a number of benefits.

These include:
- Improved quality control
- Concurrent manufacture and site preparation – units can be assembled while the structural frame is being built. The facade can also be completed a floor at a time, allowing parallel internal work
- Quicker installation, requiring less manpower on site
- No need for scaffolding
- Can be installed from the interior of the building. This is ideal for high towers or building sites where there is a tight footprint
- Less space is needed on site for layout – another advantage

Another advantage of unitised systems is that, unlike stick systems, they do not transfer impact noises from floor to floor or horizontally from room to room. This is because the unitised panels are separated by linking gaskets. The different materials (ie, gasket to aluminium), become acoustically excited to different levels, thus creating full separation at the junctions between units.
The increased use of factory assembly introduces other important considerations.

These include the following:
- The workshop has to be adequately equipped to handle finished elements
- Additional transport is required to get finished elements to site
- Additional equipment is required on site for installation of the modules.

DESIGN CONSIDERATIONS

Unitised facades offer a number of design options. They can integrate opening elements, such as a top-hung and parallel opening windows, both of which can also be motorised for ease of operation. Sun-screening systems, spandrel panels and other infill panels can also be included.

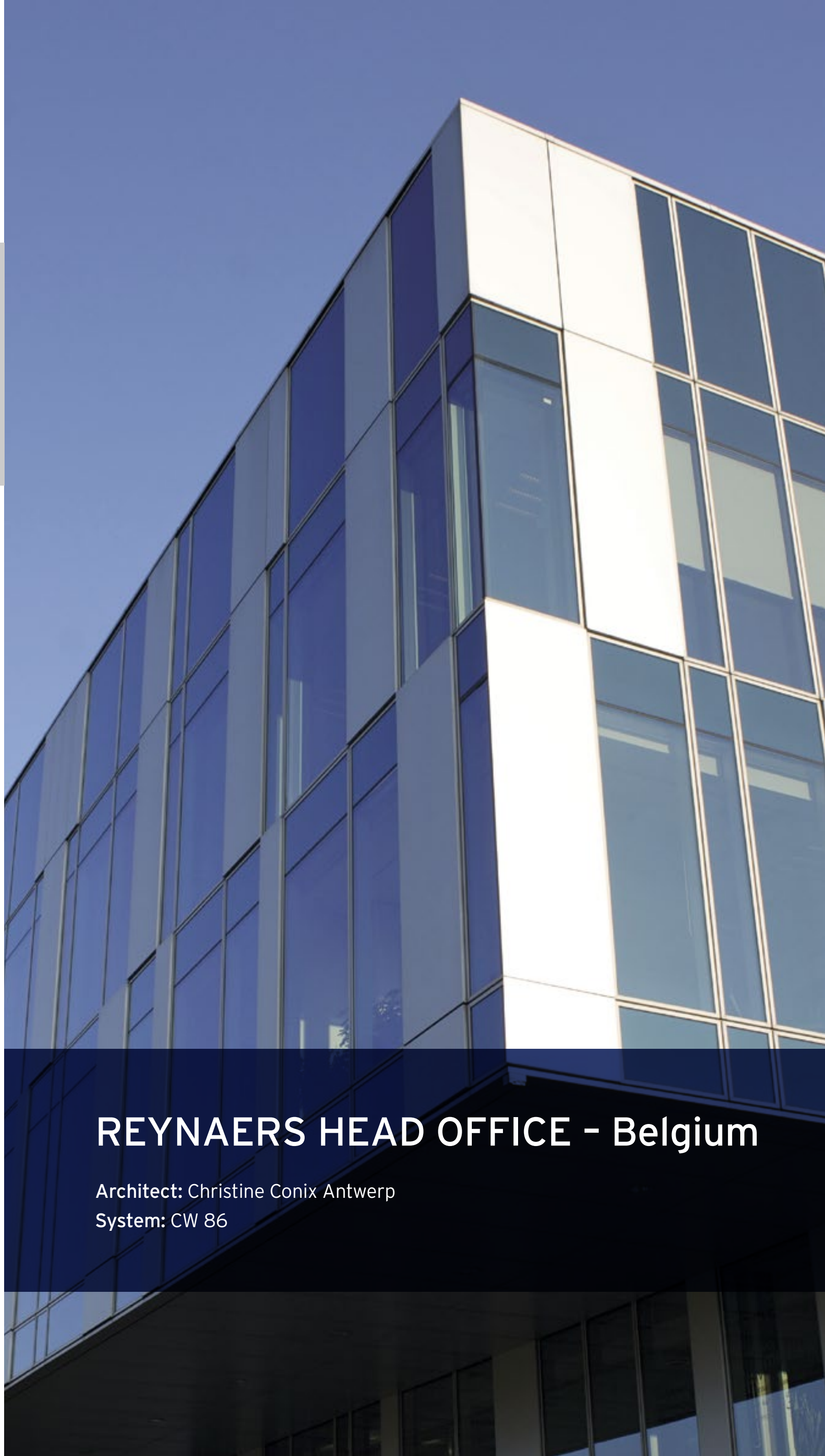
Aluminium is typically used for facade frames because of its strength and stability. It is also highly durable, moisture and corrosion-resistant and 100% recyclable.

Mullions in a unitised system tend to be slightly larger. This is because they have an open section, compared to the tube-shaped mullions used in a standard stick system.
There are a number of options for frame finishes, including anodised aluminium and RAL powder coatings.

In terms of glazing, the specification can create different aesthetic effects.

These include:
- Modular glazing, which holds the glass using picture-frame-effect glazing beads
- Structural sealed glazing, where the glass is structurally bonded, giving a continuous glazed appearance to the facade.

Various levels of thermal performance are offered, from standard to high insulation options. All variations are thermally broken but in high thermal insulation options the additional performance can be achieved by inserting fibreglass reinforced polyamide strips in a skeleton structure to create multiple chambers.



REYNAERS HEAD OFFICE – Belgium

Architect: Christine Conix Antwerp
System: CW 86

FITECO HEAD OFFICE – France

Architect: Colboc Franzen and Associes
System: CW 86-FU

LEGISLATION AND TESTING

The recognised industry standard for curtain walling in the UK is the Standard for systemised building envelopes (SSBE) from the Centre for Window and Cladding Technology.
CWCT is an industry-funded information provider and trainer in the field of building envelopes and glazing. It publishes both standards and guidance.

SSBE incorporates BS EN 13830:2003 Curtain Walling, Product Standard, and other relevant performance standards and Building Regulations. The CWCT standard covers the performance specification, testing, inspection and assessment of building envelopes constructed from systems of components.

These include:
- Curtain walling
- Rainscreen cladding
- Composite panel systems
- Slope glazing
- Window walls
- Glazing screens

The CWCT standards for air, water and wind resistance are based on environmental conditions found typically in the UK.
If specifying in other countries with a different climate, modifications must be made.

AIR PERMEABILITY
The airtightness test measures the volume of air that would pass through a closed window at a certain air pressure. The peak test pressure is determined by the specifier based on one of the classes in BS EN 12152: 2002 Curtain Walling, Air Permeability, Performance Requirements and Classification:

CLASS	PEAK PRESSURE
A2	300Pa
A3	450Pa
A4	600Pa
AE xxxx	>600Pa

The specifier must decide the level of airtightness required for a particular building. A higher test pressure may be specified if a more airtight building is required.

WATER PENETRATION RESISTANCE

Water tightness testing involves applying a uniform water spray at increasing air pressure until water penetrates the window. The peak test pressure is determined by the specifier based on one of the classes in BS EN 12154:2000 Curtain Walling, Watertightness, Performance Requirements and Classification:

CLASS	PEAK PRESSURE
R5	300Pa
R6	450Pa
R7	600Pa
RE xxxx	>600Pa

The specifier must decide the level of water resistance for a particular building based on the degree of exposure to the weather. For example, in a coastal location, they may wish to test to a higher peak pressure.

WIND RESISTANCE

The wind load resistance is a measure of the profile's structural strength and is tested by applying increasing levels of air pressure to simulate the wind force. The performance requirements with regards to wind resistance of curtain walling are listed in BS EN 13116:2001 Curtain Walling, Resistance to Wind Load.

Due to the many diverse elevational layouts and variations within curtain wall installations, it is not considered practical to structurally classify the large variety of curtain wall systems and purpose-designed constructions.

HOFTADORG - Iceland

Architect: PK Arkitektar, Reykjavik & LWW, Berlin
System: CW 86-EF Bespoke Solution, CW 50-SC

BAA HEATHROW AIRPORT – London

Architect: TBS (magenta)
System: CW 86

INSTALLATION

Unitised curtain walling can be installed either from the interior of the building using a beam on the floor above, or from the outside using a crane. The installation team must be safely connected to the structure using a lifeline or temporary balcony system.

The modules are transported to each floor level, lifted to the correct position and installed onto each floor slab. This involves hooking them onto brackets which are secured to the main substrate and levelled using jacking bolts.

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