Design and implementation of Curtain Wall System

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Curtain Wall Technologies & Systems

First Generation

“Stick Wall System”
- Curtain Wall members are fixed piece by piece
- Vertical members are usual installed 1st, which span from slab to slab
- Horizontal transom members in turn are fixed to mullions
- Finally glass / granite / aluminium panels would be fixed

Advantages (of Stick Wall System)
- Great Flexibility
- Site Modification is possible

Disadvantages
- Difficulties in quality control
- Relies heavily on site workmanship
- Requires different trades men
- Difficult to accommodate building movements
- Impossible to control water drainage to individual floor
- Requires external access (scaffolding / gondolas)
- Too many loose parts and component on site
- More storage space and longer storage time on site

2nd Generation

“Unitized Curtain Wall System”
- Pressure Equalization System
- Unitized Panel Systems

Pressure Equalization System

“Based on a simple physical principle that in equalized pressure conditions, water is heavier than air & therefore falls under gravity”.

Common problems inherent the 1st Generation C/Wall
- Water penetration
- Poor acoustic and thermal insulation
- Deterioration of expansion joints and sealant joint
3 Aspects must occur for water to penetrate a building

1. Water
2. Holes
3. Differential Pressure (or condensation / capillary action)

- By eliminating one of the above conditions, the leak will not occur.

Pressure Equalization System

- The 1st Factor (Water) is impossible to eliminate
- For many years, many C / Wall companies have tried the 2nd factor (closing all the holes) - including today
- This proved difficult to achieve
- The 3rd factor (to address the differential pressure) became feasible by adopting the principle of Pressure Equalization

Unitized Curtain wall System

- Units are assembled & glazed in factory
- Usually all components are included within the units
- Panels are packed on metal or timber pallets
- Transported to site by semi trailers
- Hoisted to required floor level by tower crane
- Site installation teams shall install individual panels to designated areas (using a monorail or mobile floor crane)

Unitized Curtain wall System

Has several advantages:
- Units are assembled & glazed under controlled shop conditions.
- Full pressure equalization drainage system at each floor
- Accommodates building movements
- Minimizes site operations
- Usually does not require external access
- Shortens Construction Duration
- Enables other subsequent internal trades to commence works much earlier.

3rd Generation

- Improvements of Techniques
- Diversification of its use
- Speed of communication which resulted in globalized products
- Products which draw from experiences worldwide
- The third generation is marked by innovations and solutions.
Innovations & Solutions:

- Innovative production lines
- Improved pressure equalization panel systems
- Improved Thermal & Acoustic Properties
- Some notable improved materials
  - Structure Sealants
  - Structural adhesives (Light composite panels)
  - Performance Glass
  - Aluminium Finishes / Coatings

3rd Generation

Structural Sealant & Application

Basically there are 2 types of structural sealant applications:

- 4 sided structural glazing,
- 2 sided structural glazing

2 sides structural glazing ~ vertical bead

2 sides structural glazing ~ horizontal bead

4 sides structural glazing

4 sides captive glazing
Sealant width (bite) often determines the width of a mullion e.g.

- WL = 3.5 kPa x 1.4 = 4.9 kPa
- C/W modulation 1500mm

Sealant Bite = \[
\frac{WL \times \frac{1}{2} \text{ short span (mm)}}{138 \text{ (Design Strength of Sealant)}}
\]

\[
\text{e.g.} = \frac{4.9 \text{kPa} \times \frac{1}{2} (1500 \text{mm})}{138}
\]

Sealant bite = 26.6mm say 27mm
Please also note width of double side tape shall be added to this figure (which is usually 6mm - 10mm).

Structural Sealants & Application

For technical information relating to structural sealant products, we recommend contacting these reputable suppliers:

- Dow Corning
- General Electric

Performance Glass

- There is a wide range of glass available on the market which varying performances considerably based on:
  - Reflective Coatings
  - Low Emission coatings (Low E)
  - pyrolytic coatings (hard coating)
  - sputtered low emissivity (soft coating)
- Type of glass treatment
  - Anneal glass ~ direct from float line
  - Heat Strengthened Glass
  - Tempered Glass

Performance Glass

- Recommend contacting major glass suppliers direct for specific individual needs & performances.
- Some reputable glass manufactures
  - Viracon
  - Glavabel
  - Pilkington
  - China Southern Glass
  - Shanghai Yaohua Pilkington
Aluminium Finishes / Coating

- Large range of paint types & finishes available
- Some reputable paint suppliers
  - Interior
    - AKZO Nobel (Powder Coat)
  - Exterior
    - PPG (PVF2)
    - Valspar (PVF2)

PERMASTEELISA - Design

Address: 1889 Harbour View Street, Central, Hong Kong
Client: Central Waterfront Property Development Ltd.
Architect (local): Rocco Design Limited
Consultant: ARUP Façade Engineering
Main Contractor: Eman-Sanfield J.V.
Contractor: Construction Co., Ltd.
Thanks for Your Attention!

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