



## 2.17. Balcony, Windows, Terrace and Balustrades

### 2.17.1. Awareness

**2.17.1.1.** Codes and regulations cannot prevent falls and accidents involving balconies, windows, railings and terraces. Therefore, awareness of dangers caused by human negligence (Parents and Guardians) is of high importance, especially in these times of high-rise living and working spaces.

**2.17.1.2. NEVER LEAVE** children, special needs people, mentally challenged, mentally unstable and elderly people **UNATTENDED and UNSUPERVISED** at the balconies, near windows, railings and terraces.

**2.17.1.3. NEVER KEEP** furniture, bedding, articles or climbable objects near windows, balconies, railings and terraces, which can be translated into **'LADDER'** by innocent and unwary children.

**2.17.1.4. ALWAYS LOCK** access to terraces, balconies, railings and window panes when children, special needs people, mentally challenged, mentally unstable and elderly people are left unattended.

**2.17.1.5. ALCOHOL, DRUGS AND INTOXICATION** can cause accidents. As an Adult, behave safely and responsibly near balconies, windows, terraces and railings.

### Did You Know?

**There were 19 Balcony and Window related deaths in the last 3 years.**

**The "Tragic and Curious case of balcony deaths in UAE" are because of parental and guardian negligence.**

### 2.17.2. Minimum Construction Requirements for Balconies and Railings

**2.17.2.1.** Guards are required for any space, walking or standing which is elevated 760mm above the finished grade level.

**2.17.2.2.** From the finished floor level, Height of the balcony, terrace railings, elevated space railings **(A)**, shall not be less than 1200 mm.

**2.17.2.3.** Balusters openings, the separation distance between vertical posts or members **(B)**, of balcony, guardrail or handrail shall not allow the passage of a 100 mm diameter sphere.

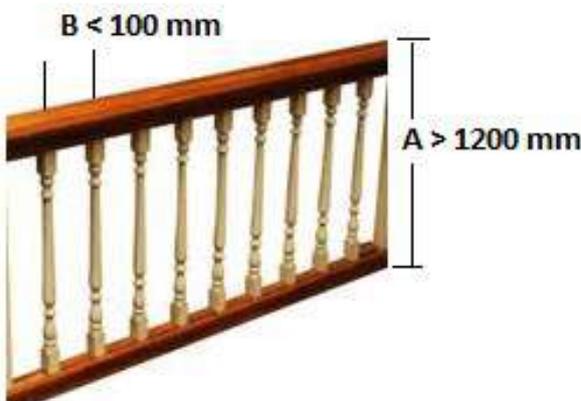


Figure 1.16.a.: Balcony Railing Specifications



**2.17.2.4.** Any opening (B) formed by either vertical posts, curved frames or design features in the balcony or railings shall not be more than 100 mm. See **Figure 1.16 a** and **Figure 1.16 b**.

**2.17.2.5.** Horizontal elements, bars, climbable features shall not be installed up to 760 mm. i.e., up to (D). Where horizontal or climbable elements are present in this zone, the 1200 mm height requirement shall start at the highest of those climbable elements.

**2.17.2.6.** If the design demands any gap between finished floor surface and the bottom most horizontal component of the railing (E), such gap shall not be more than 100mm. See **Figure 1.16 b**.



**Figure 1.16.b.: Balcony Railing Specifications**

**2.17.2.7.** The balcony, Handrail, Guard assembly shall be able to withstand a single concentrated load of 200 pounds (0.89 kN), applied in any direction at any point.

**2.17.2.8.** If the design demands usage of glass panels in the balcony construction, such glass shall be laminated glass which holds in place if shattered and withstand a load of 200 pounds (0.89kN), applied in any direction at any point. See **Section 5, Glazing, Safety Glass**.

**2.17.2.9.** Balconies and terraces shall not have accesses with self-closing or self-latching doors, which can accidentally lock people outside in the balcony or terrace, compelling them to misadventures such as climbing, descending or crossing over to other balconies.

**2.17.2.10.** Also see **Chapter 3, Table 3.4.11.**, Guards.



### 2.17.3. Minimum Construction Requirements for Windows

- 2.17.3.1. Openable Windows shall open outward from the top. See Figure 1.17 b. Openable windows shall not open from below.
- 2.17.3.2. Sliding and openable Windows shall not be located at (F), a height less than 865 mm from the finished floor surface level. If window base is present on the finished floor, the height (F) shall be measured from the top of such window base. See Figure 1.17 a.
- 2.17.3.3. The window pane, if openable, shall not create a gap of more than (G), 100 mm from the wall, when opened. See Figure 1.17 b.
- 2.17.3.4. The window assembly, shall have reinforced or safety glass and shall be able to withstand a single concentrated load of 200 pounds (0.89 kN), applied in any direction at any point.
- 2.17.3.5. There should not be any construction features at the bottom of the window which can be exploited into 'ladder or climbing feature'.



Figure 1.17a: Window Specifications

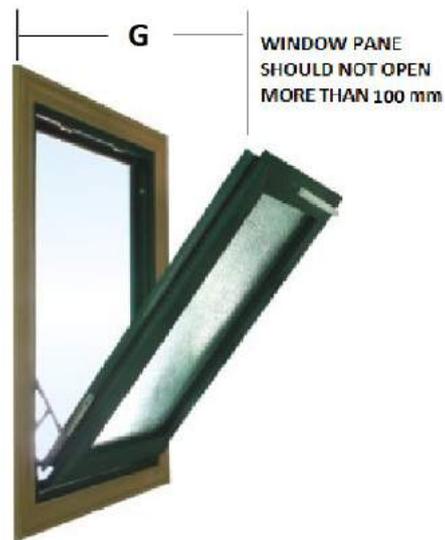


Figure 1.17b: Window Specifications

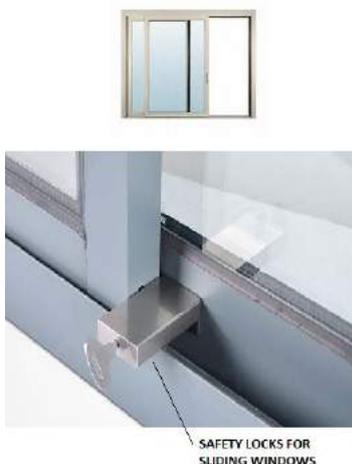


Figure 1.17c: Window Safety



2.17.3.6. See Section 2.17.1.3. Provide locks and safety measures for sliding windows. See Figure 1.17c.



#### 2.17.4. Balustrades

**2.17.4.1.** A railing or fencing supported by balusters, especially one forming an ornamental parapet or barrier to a balcony, bridge or terrace. However, in the context of safety intent of this section, the terms “Balustrade”, “Guard”, “Barrier” and “Railing” shall all have the same meaning and intent, that being to prevent persons accidentally interacting with the hazard on the other side of the barrier or slipping through to a falling hazard.

**2.17.4.2.** Where balcony finishes are flush with the edge of the balcony, an up-stand feature of a minimum 20 mm height following the same line as the balustrade shall be provided to prevent items on the balcony rolling off the edge.

#### 2.17.5. Railing, Balustrade and Fence Toppings

**2.17.5.1.** Fence or Railing or Balustrade toppings shall be designed and constructed such that they do not constitute a potential danger of injury to persons. This includes but not limited to spikes, sharp or barbed wire or other jagged or similarly protruding features.

#### 2.17.6. Glass used in Railings and Guards

**2.17.6.1.** Glass used as structural balustrade panels in railings shall be constructed of one of the following.

- a. Laminated fully tempered glass with a structural interlayer where structural capacity is calculated at 50 Deg Celsius.
- b. Laminated heat-strengthened glass

**2.17.6.2.** Glazing in railing in-fill panels shall meet the requirements of **Section 5.4.2.**

**2.17.6.3.** Structural balustrade panels shall meet the following requirements.

- a. The panels and their support system shall be designed to withstand the loads specified in ASCE (American Society of Civil Engineers).
- b. A human impact load safety factor of 4 shall be used.

**2.17.6.4.** Each handrail or guard section shall be supported by a minimum of three glass balusters, or shall be otherwise supported to remain in place if one baluster panel fails, and one of the following criteria shall be met.

- a. An attached handrail or guard shall be provided.
- b. The glass balusters shall be laminated glass with two or more glass plies of equal thickness and the same glass type, and each of the plies of the panels shall be designed to withstand the loads specified in ASCE (American Society of Civil Engineers) and any other structural requirements for a top rail.

**2.17.6.5.** Glazing materials shall not be installed in railings in parking garages, except for pedestrian areas not exposed to impact from vehicles.



### 2.17.7. Maintenance of Railings and Guards

**2.17.7.1.** Both Facility management and the occupants are responsible for SAFETY of railings and guards.

**2.17.7.2.** Balcony, Terrace and elevated spaces railings and guards shall be inspected regularly for damages and warning signs of wear and tear. See **Chapter 18. Responsibilities of Stakeholder, Section 2.12. Facility Management Responsibilities.**

**2.17.7.3.** Some of the warning signs could be corrosion, cracks, bending, loose and shaking members of the railings and guards, including nuts, bolts and fasteners.

**2.17.7.4.** Any unsafe balcony, terrace or elevated spaces' railings and guards shall be replaced immediately.



## 3. Firestop Systems

### 3.1. Intention

- 3.1.1.** The provision of this section shall specify the minimum requirements for the classification, design, installation, inspection, and maintenance of firestop systems to achieve required fire-resistance-rated construction and compartmentation.
- 3.1.2.** To ensure Firestop systems consist of a material, or combination of materials installed to retain the integrity of fire resistance rated construction by maintaining an effective barrier against the spread of flame, smoke and/or hot gases through openings (gaps) that accommodate penetrations, fire resistive joints and perimeter openings.
- 3.1.3.** To ensure Firestop systems are used in locations including, but not limited to, the following as shown in **Figure 1.18.a.**

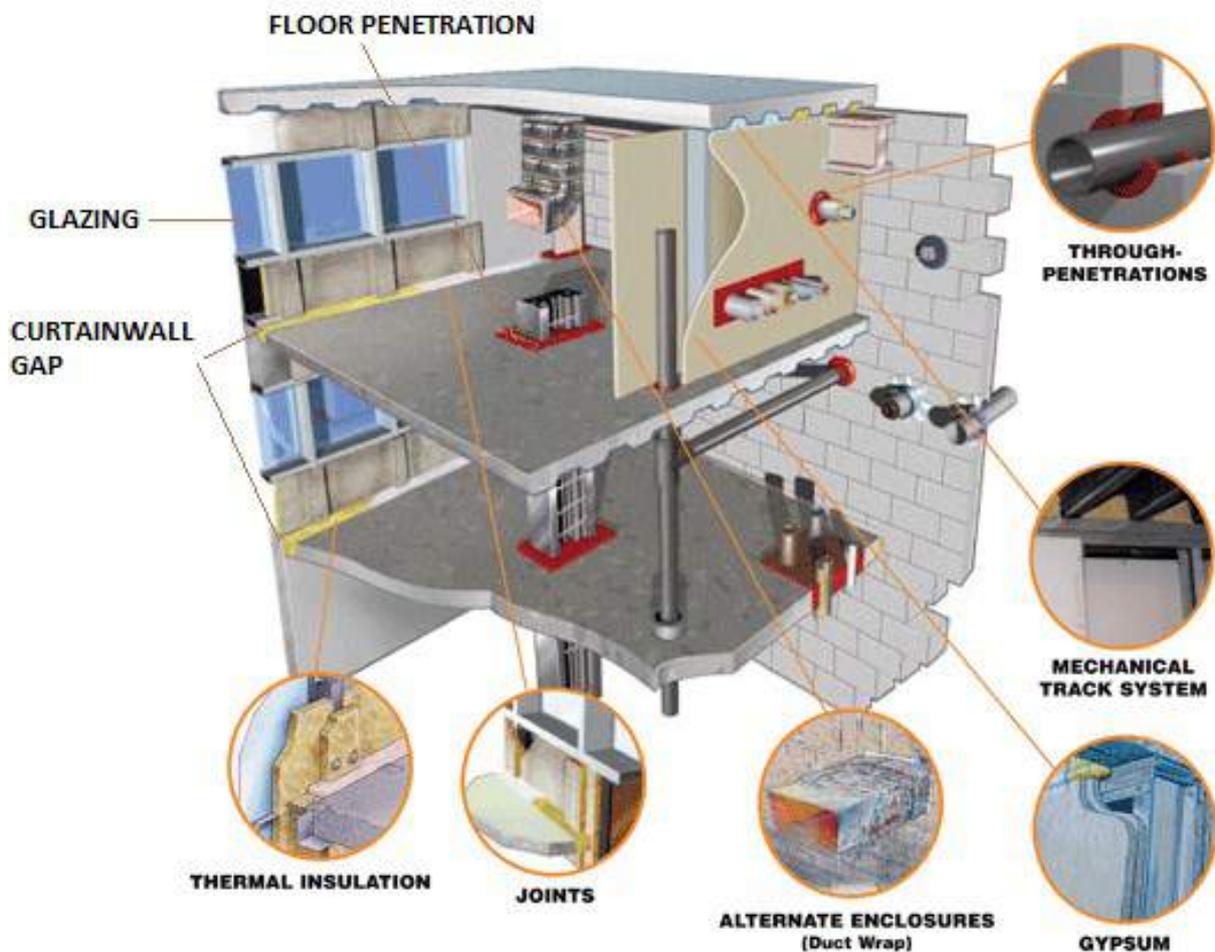


Figure 1.18.a.: Firestopping Systems at various locations



- a. Penetrations through fire resistance rated floor including both empty openings and openings containing penetrants.
- b. Penetrations through fire resistance rated wall assemblies including both empty openings and openings containing penetrants.
- c. Membrane penetrations in fire resistance rated wall assemblies where items penetrate one side of the barrier.
- d. Joints between fire resistance rated assemblies.
- e. Perimeter gaps between rated floors and an exterior wall assembly.

## 3.2. Classification of Firestop Systems

### 3.2.1. Through penetration Firestop system

- a. This category addresses openings in fire rated assemblies where penetrants are passing through a fire-rated construction and where the integrity of the wall and/or floor needs to be maintained.
- b. The penetrants include, but are not limited to, mechanical, electrical, piping, structural and communication devices.

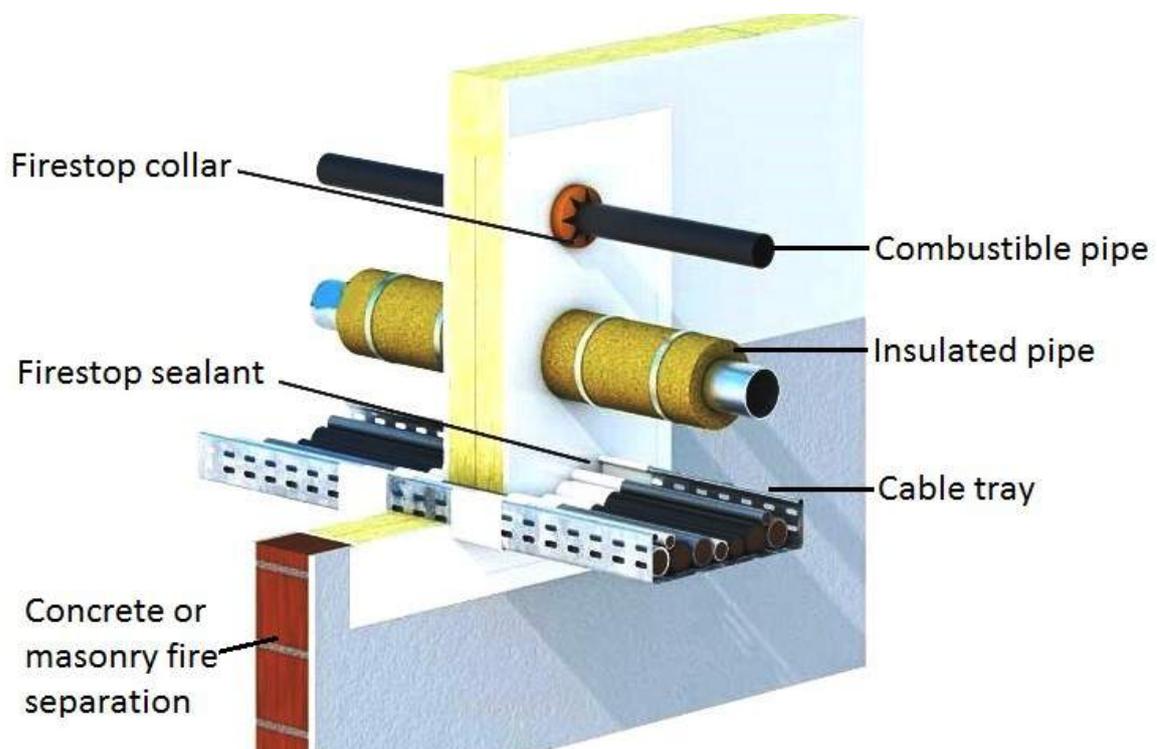


Figure 1.18.b.: Through penetration Firestop System



### 3.2.2. Membrane-penetration

- a. This category addresses openings in fire rated assemblies where only one side of the fire rated barrier is penetrated and where the integrity of the wall or floor needs to be maintained. This would include items such as, but not be limited to, electrical outlet boxes and other electrical devices.
- b. Membrane penetrations shall be permitted to be created on both sides of the wall (or floor) as long as they are protected with a membrane penetration firestop system or wall opening protective.

### 3.2.3. Fire resistive joint systems

- a. This category addresses any gap, joint, or opening (whether static or dynamic) between two fire-rated barriers including where the top of a wall meets a floor, wall edge to wall edge configurations, floor edge to floor edge configurations, floor edge to wall configurations.
- b. The maximum movement that a fire resistive joint system is able to accommodate, as shown in the design listing, shall be equal to or greater than the movement that is expected or specified for a given joint in construction or design documents. All joints shall be assumed to be dynamic unless specified otherwise in construction documents.

### 3.2.4. Perimeter fire barrier system

- a. This category addresses any gap, joint, or opening, whether static or dynamic, between a fire-rated floor assembly and a non-rated exterior wall assembly.

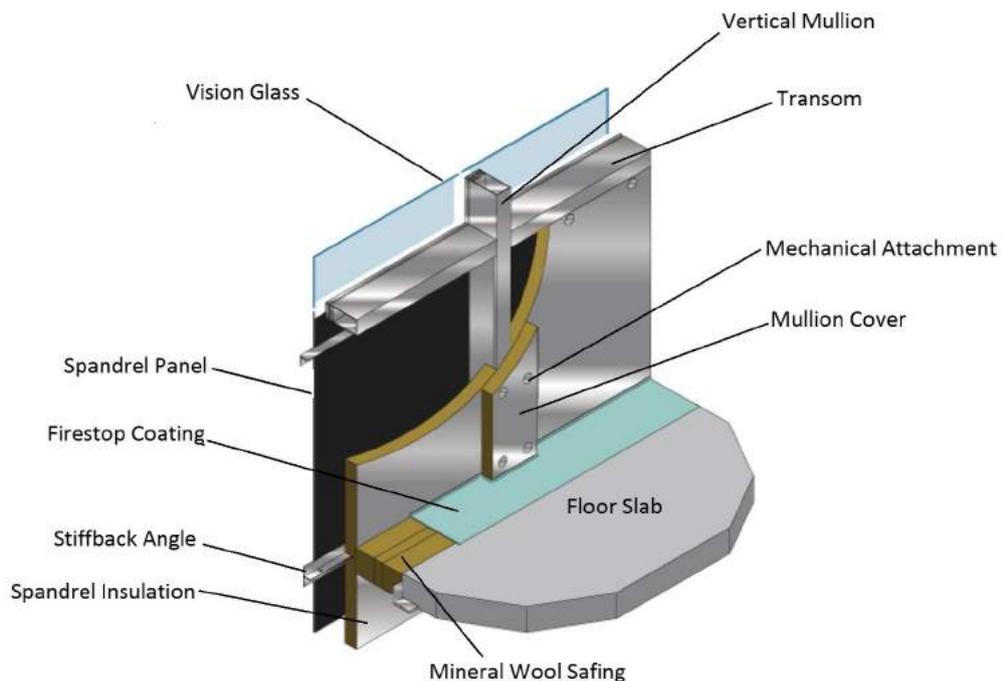


Figure 1.18.c.: Perimeter Fire Barrier System



- b.** The perimeter barrier shall be intended to restrict the interior vertical passage of flame and hot gases from one floor to another at the location where the floor intersects the inside of an exterior curtain wall. The perimeter fire barrier shall remain securely in place and provide interior joint protection for the time period no less than the fire-resistance rating of the floor assembly.
- c.** Where air gaps and ventilation are intended behind the façade such as in rain screens or such designs, the vertical open gap between exterior façade and building envelope shall have an approved cavity barriers using intumescent fire stopping arrangements at every floor joints.
- d.** Except for Open parking OR buildings which are less than 15 m in height, openings in exterior walls in adjacent storeys shall be separated vertically to protect against fire spread on the exterior of the buildings where the openings are within 1524 mm radius of each other horizontally and the opening in the lower storey is not a protected opening with a fire protection rating of not less than 3/4 hour. Such openings shall be separated vertically at least 915 mm by spandrel girders, exterior walls or other similar assemblies that have a fire-resistance rating of at least 1 hour or by flame barriers that extend horizontally at least 760 mm beyond the exterior wall. Flame barriers shall also have a fire-resistance rating of at least 1 hour. Where separation spandrel is less than 915 mm, the perimeter barrier system shall be tested, certified and listed with intended spandrel specifications, complete with installation guidelines.
- e.** Vertical separation between spaces leased to different tenants and between public and nonpublic spaces shall be protected to achieve a fire-resistance rating equal to that of the vertical wall assembly.
- f.** The components of the curtain wall and fire stopping shall be such that if sections of the curtain wall are damaged or collapse, the integrity of firestop and its ability to provide the required fire resistance is not compromised.
- g.** All perimeter barrier systems shall be listed and approved system assemblies.



### 3.3. Firestop systems testing and acceptance

- 3.3.1.** For all types of firestop systems, only tested and Civil Defence listed systems shall be used as per tests required by **Section 7**.
- 3.3.2.** Through penetration firestop system ratings shall be established in accordance with ASTM E 814, UL 1479, EN 1366-3, FM 4990 or other equivalent tests as the test method, approved by Civil Defence. See **Section 7.1.12**.
- 3.3.3.** Membrane firestop system ratings shall be established in accordance with ASTM E119, E 814, UL 263, UL 1479, BS EN 1366-3, BS EN 1366-4, FM 4990 or other equivalent tests as the test method, approved by Civil Defence. See **Section 7.1.14**.
- 3.3.4.** Fire resistive joint system ratings shall be established in accordance with ASTM E 1966, UL 2079, FM 4990, BS EN 1366-4 or other equivalent tests as the test method. See **Section 7.1.13**.
- 3.3.5.** Perimeter fire barrier system ratings shall be established in accordance with ASTM E 2307, BS EN 1364-3 (Full configuration test) or BS EN 1364-4 (Part configuration test) or other equivalent tests using the Intermediate-Scale, Multi Story Test Apparatus (ISMA) as the test method. See **Section 7.1.17**.
- 3.3.6.** System rating: The rating of installed firestop systems shall be equivalent to the rating of the barrier (floor/wall) in which the Firestopping is installed.
- 3.3.7.** Single source limitation: Firestop systems for each kind of classified assembly shall be obtained from a single manufacturer. Materials from different manufacturers shall not be installed in the same firestop system or opening.



### 3.4. Design, Installation, Inspection and Maintenance

#### 3.4.1. Design, planning and preparation

- a. Design, material selection, scheduling, approved contractor selection etc. shall be Consultant's responsibility. It is consultant's responsibility to recruit Fire-stopping specialists qualified as per **Section 3.6.8.**, either in-house or hire Civil Defence approved House of expertise having Firestopping Specialists to design, supervise contractors and perform progressive inspections.

#### 3.4.2. Product systems and Submittal

- a. All the products, as part of the system, shall bear design listing and approval label to conform to the construction type, penetrant type, annular space, joint gap and fire rating requirements of each separate assembly.
- b. Product manufacturer/supplier shall provide a formal submittal consisting of system design listing or test certifications, including illustrations, from an accredited testing laboratory as per referenced standards that is applicable to each system configuration.
- c. Engineering Judgment (EJ) – Where there is no specific tested and listed fire-stop system available for a particular configuration, the manufacturer shall provide a site specific EJ, along with Consultant and Firestop system contractor's stamp and acceptance.
- d. Method Statement shall clearly define the manufacturer's installation instructions.
- e. Statement of manufacturer's or installer's standard warranty for minimum of 10 years.
- f. Manufacturers shall submit an undertaking letter in understanding with Civil Defence that supplying any material that is non complaint to this code is illegal and punishable.
- g. It is main consultant's responsibility to verify all the above.

#### 3.4.3. Delivery, Storage and Handling

- a. The products shall be delivered to project site in original, unopened containers or packages with intact and legible manufacturer's labels identifying product name, product manufacturer, manufacturing and expiry dates, lot number, design listing and classification marking.



- b. Products shall be stored and handled as per manufacturer's instructions to prevent deterioration or damage due to moisture, temperature changes, contaminants, or other causes.
- c. All materials shall be installed prior to expiration of shelf life.
- d. It is main consultant's responsibility to verify all the above.

#### **3.4.4. Site examination and preparation**

- a. General conditions of substrates, opening configurations, penetrating items, joint gaps, and other conditions affecting performance shall be thoroughly examined.
- b. The installer shall verify that all pipes, conduits, cables, and/or other items which penetrate fire-rated construction have been permanently installed before starting firestop installation.
- c. Installation of systems shall commence only after unsatisfactory conditions have been corrected.
- d. It is main consultant's responsibility to verify all the above.

#### **3.4.5. Project conditions (environmental limitations)**

- a. Systems shall be installed when ambient or substrate temperatures are within limits as per manufacturer's written instructions.
- b. Do not install Firestopping when substrates are uncured, wet due to rain, frost, condensation, or other causes. Installer shall ensure that firestop materials are installed so as not to contaminate adjacent surfaces.
- c. It is main consultant's responsibility to verify all the above.

### **3.5. Installation, Identification & Labeling**

#### **3.5.1. Installation**

- a. Installer shall strictly follow certified listed system including illustrations, installation drawings therein and manufacturer's installation instructions.

#### **3.5.2. Identification & Labeling**

- a. Identify installed firestop systems with pressure-sensitive, self-adhesive, pre-printed vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of firestop system where labels will be visible to anyone seeking to remove penetrating items or firestop systems.



- c. The labels shall include the following information:
  - i. The words "**Warning – Through-Penetration Firestop System – Do Not Disturb. Notify Building Management of Any Damage**".
  - ii. Firestop product name with system listing number.
  - iii. Name and address of Manufacturer, Installer and Consultant/House of Expertise.
  - iv. Installation date.
- d. Labels and markings may be omitted if they would be visible in a finished area. Such labels and tags shall be available with facility management with the written authorization of the Civil Defence.

### 3.5.3. Installer qualification

- a. Installing contractors shall have Civil Defence listing and approval based on any of the following certifications.
  - i. FM certification on Class 4991 approval for firestop contractors.
  - ii. UL certification for qualified firestop contractor.
  - iii. IFC (International Firestop Council) Firestop expert exam certificate.
- b. The installer shall be tested with written examination and licensed by Civil Defence. The Civil Defence license is based on qualification as per **section 3.5.3.a.** and the training and certification by the firestop manufacturer to install manufacturer's products as per specified listed system requirements.

## 3.6. Inspection and Field Quality Control

- 3.6.1. Inspection of through penetration firestop systems shall be in accordance with ASTM E 2174, Standard Practice for On-Site Inspection of Installed Fire Stops.
- 3.6.2. Inspection of fire resistive joints and perimeter barriers shall be in accordance with ASTM E 2393, Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.
- 3.6.3. Inspection shall take place in successive stages as installation proceeds.
- 3.6.4. Installed firestop systems shall not be concealed from view until the Firestopping specialist has inspected and approved each installation.
- 3.6.5. Do not proceed with installation for the next area until Firestopping specialists have determined that completed work shows compliance with requirements.
- 3.6.6. Work shall not be certified as completed unless approved by the consultant's Firestopping specialist or Civil Defence approved house of expertise.



### 3.6.7. Inspector Qualification

- a. Inspections shall be consultant's responsibility and ensure that contractor work is inspected through in-house Firestopping specialists or shall hire the services of Civil Defence approved House of Expertise.
- b. It is consultant's responsibility to recruit in-house qualified Firestopping specialists for design as well as inspection or to hire services of Civil Defence approved house of expertise, having registered Firestopping specialists..
- c. Consultant or house of expertise, who inspect the installation, shall certify and sign off the Firestopping installation inspections undertaken during progressive inspections at each successive stage of installations in report, which shall be part of the documentation required by Civil Defence during final inspection and handing over.
- d. Main Consultant or Civil Defence approved house of expertise undertaking Firestopping inspections, shall have the following qualifications.
  - i. Accreditation to ISO/IEC 17020 or IAS AC 291 criteria or any other international accreditation acceptable to Civil Defence and Municipality.
  - ii. 2 Engineers, qualified in accordance with **Section 3.6.8.**
  - iii. Training and Certification by system manufacturers.
  - iv. 3 years experience in Firestopping inspections.

### 3.6.8. Firestopping Specialist Qualification

- a. Fire stopping specialists of consultant's in-house team or Civil Defence approved house of expertise undertaking Firestopping design, consultancy or inspection shall have the following qualifications.
  - i. Bachelor's degree in engineering.
  - ii. Certifications from any of the following.
    - ii.1. FM Firestop exams certification.
    - ii.2. UL/ULC Firestop exams certification.
    - ii.3. Intertek's IQP program certification
    - ii.4. IFC (International Firestop Council) Firestop Expert exam certificate.
  - iii. 5 years experience in Firestopping systems' design and inspection.
  - iv. Training and Certification by system manufacturers.
- b. The Firestopping specialists of consultant's in-house team or of Civil Defence approved house of expertise, undertaking Firestopping design, consultancy or inspection shall be certified and licensed by Civil Defence, based on their qualifications as required by **Section 3.6.8.a.** and written examination.



### 3.7. Maintenance & Management

- 3.7.1. Provide protection and maintain conditions during & after installation that ensure installed firestop systems are without damage or deterioration at the time of Substantial Completion. If, despite such protection, damage or deterioration occurs, damaged/deteriorated systems shall be removed and replaced with new ones.
- 3.7.2. The condition of installed firestop systems shall be visually inspected by the owner or owner's representative annually. Damaged, altered or breached firestop systems shall be properly repaired, restored or replaced to comply with applicable codes as per the guidelines of Civil Defense.
- 3.7.3. Any new openings made therein for passage of through penetrants shall be protected with approved firestop system to comply with applicable codes as per the guidelines of Civil Defense.

### 3.8. Civil Defence Acceptance

- 3.8.1. The main consultant, the firestop system manufacturer, firestop system installer, firestop specialist and the house of expertise shall jointly sign off the installation and provide final inspection report for Civil Defence' acceptance as evidence of compliance.



## 4. Façade and Exterior Wall Covering Systems

### 4.1. Applicability

- 4.1.1. The provision of this section specifies the minimum requirements for the classification, combustibility, surface burning and flame spread ratings, design, installation, inspection, and maintenance of exterior façade wall cladding, balcony coverings and components such as, Metal Composite Panels, Aluminum Composite Panels, Polycarbonate Panels, EIFS, ETICS, GRC, GRFC, GRP, Glazing, insulation, sealants etc.
- 4.1.2. The weather protection of buildings is not the scope or intention of this section. Thermal and Weather protection aspect of the building façade, such as protection from temperature, wind, water, pressure etc., shall comply with Municipality regulations, assembly tests and requirements.
- 4.1.3. The intention of this section is to ensure that flame spread on exterior façade is restricted.
- 4.1.4. This section applies only to non load bearing exterior walls.
- 4.1.5. Where exterior walls are required to be loadbearing, such walls shall comply with relevant sections of this **Chapter**.

### 4.2. Material Tests

- 4.2.1. Except for natural stones and concrete, only materials, tested, listed with Civil Defence and complying to the following sections shall be allowed on exterior facades, based on the building height and occupancy types.
  - a. **Metal Composite Materials (MCM, ACP) complying to Section 4.6.**
  - b. **Exterior Insulation and Finish Systems (EIFS) and External Insulation Composite System (ETICS) complying to Section 4.7.**
  - c. **Polycarbonate External Wall and Façade System (PEWFS) complying to Section 4.8.**
  - d. **Sandwich Panels complying to Section 4.9.**
  - e. **GRC /GRFC and GRP Systems to Section 4.10.**
  - f. **Glazing Systems complying to Section 5.**
- 4.2.2. Where “Assembly Tests” are mandated by **Section 4.2.1.**, the tests shall be conducted for the entire system assembly, that is intended for use on building façade, including wall panels, cavities, insulation, panel rails, joints, sealants, seams, fasteners, barriers and other construction details. Laboratories testing assembly tests shall ensure that the test specimen is duplicated as per intended final installation specifications, including dimensions, cavities, joints and sealants. Laboratories shall ensure that façade assembly tests are not ‘over engineered’ purely to pass test criteria.
- 4.2.3. The tests shall clearly indicate “Pass” or “Fail” criteria and such results shall be clearly noted on the Test Certificates (and CoC, Certificate of Compliance), in evaluation of the following minimum requirements.
  - a. The wall assembly shall resist flame propagation over the face of the exterior wall.
  - b. The wall assembly shall resist flame propagation over the face of the interior of the wall assembly and cavity.
  - c. The wall assembly shall resist flame propagation from one story to the next.
  - d. The wall assembly shall resist flame propagation from compartment of fire origin to the adjacent compartment.





### 4.3. Flame Spread on Exterior Façade

- 4.3.1.** Building fires that envelope the façade may be initiated externally from outside the building sources such as BBQ activity in the balconies, trash can fires, fire works displays, careless disposals of cigarette butts, electrical fires from cables running in façade cavities or arson. Fires can originate internally from internal room fire loads of the building and spread to exterior façade through openings on the exterior walls such as doors, windows, shattered glazing because of flashover.
- 4.3.2.** Interior fires are intervened and controlled by automatic sprinkler system or by fire fighters. However, when the fire outgrows fire fighter's efforts or the sprinkler system and reaches flash over stage, it leaps out from the openings onto the exterior façade or cavities behind the façade of the building causing "leap frog" effect.
- 4.3.3.** At this stage, if the façade material delaminates, exposing the core, if the core of the facade material is combustible, if the cladding system components such as sealants, linings, insulation are combustible, the flames start consuming the combustible material on the façade, spreading along the surface of the façade and along the cavities behind the façade.
- 4.3.4.** If the floor slab fire stopping is absent or fire stop material is not approved and not installed as per standards, if the curtainwall is not listed, the flames penetrate through the gaps and reach for the upper floors. Flames can even propagate downwards if the material on façade is flammable.
- 4.3.5.** Such propagated flames find the other openings of the building from exterior and enter back into the buildings, feeding on the interior fire loads. This "Reverse leap frog" effect continues along the building from floor to floor, to height and width, consuming the building façade swiftly.
- 4.3.6.** Cavity can be part of the façade system by design or cavity can be created by combustible materials on façade system or poor integrity of the façade panels or poor performance of perimeter joint systems and fire stopping systems or combinations of these factors. As flame propagates and enters this cavity behind façade system, it can elongate ten times its length in its search for oxygen in the confined space of such cavity, thus burning behind the façade system unnoticed from outside for many floors above the fire origin.
- 4.3.7.** As the intense heat develops behind the façade and flames continue to grow, façade panels delaminate, exposing more core material to the flame, resulting in a sudden engulfing of vast area and multiple stories of the building façade under fire.
- 4.3.8.** Apart from combustible façade materials, poor installation, poor joint detailing, poor mechanical detailing in fixing insulation and façade panels and poor railing system installations contribute to the rapid façade flame spread and collapse of façade panels and frames, making external fire fighting extremely difficult.



- 4.3.9.** Thus the whole mechanism involved in façade flame spread, after the initial ignition, can be pin pointed to the following factors.
- a. Readily Combustible Core of the façade material (Insulation/Sealants/Panels)**
  - b. Inferior Façade Panel integrity (Poor Panel make and skin bonding)**
  - c. Non tested and Non listed Façade, Sealants and Fire stopping systems**
  - d. Poor installation of Façade and Fire stopping Systems**
  - e. Lack of Thermal barriers and Cavity fire barriers**
- 4.3.10.** The initial ignition of the fire can be attributed to human behavior as well. **See Chapter 18., Section 2.21. Responsibilities of Residents.**

## 4.4. Façade Approval from Civil Defence

### 4.4.1. Ten Point Approach to mitigate Façade Fires

Following 10 approaches have been adopted by UAE Civil Defence to tackle the causes of Façade flame spread, pointed out in **Section 4.3.9.**

- 4.4.1.1. Core of the Façade material shall be tested in exposed form as per test requirements of this code.**
- 4.4.1.2. Façade panel as a product shall be tested as per test requirements of this code.**
- 4.4.1.3. Façade system as wall assembly shall be tested or listed as per test requirements of this code.**
- 4.4.1.4. Curtainwall, Perimeter joints and fire stopping shall be a listed system.**
- 4.4.1.5. Cavity Fire Barrier bands shall be provided in concealed cavities between façade and primary substrate, at every slab.**
- 4.4.1.6. Fire Breaks shall be provided vertically on exterior façade.**
- 4.4.1.7. Exterior Sprinklers should be considered for the balconies having combustible facade. Interior window sprinklers should be considered for the glazing. See Chapter 9.**
- 4.4.1.8. Consultants shall have competent and qualified façade specialists in-house or shall hire Civil Defence approved house of expertise who have experience and expertise in façade consultancy for Façade design, system selection and supervision of the façade contractor.**
- 4.4.1.9. Façade contractor and fabricator shall be approved by Civil Defence, with valid Civil Defence License.**
- 4.4.1.10. Façade installation shall be inspected throughout installation process and certified by Consultant or Civil Defence approved House of Expertise.**



#### 4.4.2. Component (Product/Panel) Approval

- 4.4.2.1.** Approval of “product” or “panel” or component is manufacturer’s responsibility. Manufacturer or supplier shall test the individual product or component as part of the assembly (**TEST 1**, as per **Tables 1.14., 1.15., 1.16., 1.17.**, as applicable) to evaluate flame spread characteristics, droplets and smoke emission of the core, the skin, adhesive, panel and the product, and obtain approval and product registration from Civil Defence. The Civil Defence certificate shall only be for the product and permission to be installed “only on low rise buildings”.

#### 4.4.3. Wall System or Wall Assembly Approval

- 4.4.3.1.** Approval of façade wall “system” intended to be used as “assembly” on façade of a building shall be the responsibility of the consultant and façade contractor. The consultant shall ensure that the façade contractors or fabricators test the façade system as per Civil Defence regulation and configurations. (**TEST 2**, as per **Tables 1.14., 1.15., 1.16., 1.17.** as applicable).

- 4.4.3.2.** Where manufacturer or supplier undertakes both tests, **TEST 1**, as per **Section 4.4.2.1.** as well as **TEST 2**, as per **Section 4.4.3.1.**, and produces the “system” test certificates, the Civil Defence registration and certificate shall be for the product including full system and permission to be installed on exterior façade of any building, provided that the façade fabricator undertakes that project façade arrangement matches the tested and certified wall assembly arrangement.

- 4.4.3.3.** The system manufacturer or supplier and the fabricators shall provide a formal submittal to the Municipality and Civil Defence material approval department for the product registration, that shall consist of the following.

- a.** Product Data – Manufacturer's Specifications, Technical Data and Material Safety Data Sheet for each material including the composition and limitations, if any.
- b.** Design Listings and certifications – Core test certifications, Product test certifications, Assembly test certifications, System design listing or test certifications, including illustrations, from an accredited testing laboratory as per referenced standards that is applicable to each system configuration. Test reports without certification from accredited laboratories is invalid.
- c.** Method Statement shall clearly define component list and the manufacturer’s installation instructions.
- d.** Statement of Manufacturer’s standard warranty for minimum of 10 years.
- e.** An undertaking letter in understanding with Civil Defence, that supplying any material or system that is non compliant to this code is illegal and punishable.

- 4.4.3.4.** Where the building envelope is uniquely shaped and designed, or there is no clear distinction between vertical façade and horizontal roofing, or where a single envelope is installed as roofing as well as façade envelope, such materials and system assembly shall be tested for both façade as well as roofing requirements in accordance with **Section 4, Section 5 and Section 6 of this chapter.**



#### 4.4.4. Design, Specifications and Proposal Approval

- 4.4.4.1. It is consultant's responsibility to recruit Façade specialists in house or hire Civil Defence approved House of Expertise to design the façade system in complete compliance with this code.
- 4.4.4.2. Consultant's façade design submittal to Civil Defence shall be during project design NOC application, along with architecture, fire alarm, fire fighting and smoke control proposals. See **Annexure 1. Drawing Submission Requirements.**
- 4.4.4.3. Consultant's façade design shall be complete with system listings, material approval certifications, drawings, sections, illustrations specifying installation methods as per manufacturer's guide-lines, insulations, thermal barriers, panel railing, cavity fire barrier locations/specifications, primary substrate details and fixing details.
- 4.4.4.4. Engineering Judgments (EJ), if any, shall be permitted where Civil Defence has no objections. Such Engineering Judgment submissions to Civil Defence shall be site specific, prepared and stamped jointly by main consultant, House of expertise, Cladding contractor, façade system manufacturers and façade installers.
- 4.4.4.5. Where the building envelope is uniquely shaped and designed, or there is no clear distinction between façade and roofing, or where a single envelope is installed as roofing as well as façade envelope, such materials and system assembly shall satisfy both façade and roofing test requirements and shall be subjected to "mock-up" tests, if Civil Defence initiates such a requirement based on the proposal reviews.

#### 4.4.5. Installation

- 4.4.5.1. It is consultant's responsibility to ensure that the installers and fabricators hired are qualified and approved by Civil Defence. See **Chapter 18. Section 2.5. Consultant's Responsibilities.**
- 4.4.5.2. It is consultant's responsibility to ensure that the installation is carried out by Civil Defence and Municipality approved installers and fabricators as per the design specifications, system manufacturer's installation instructions and complies with code and the local construction regulations.

#### 4.4.6. Installer Qualification

- 4.4.6.1. Installer specializing in façade and cladding system shall be trained as per manufacturer's standards and guidelines and certified by the system manufacturer.
- 4.6.6.2. The trained and experienced installer shall be qualified and licensed by Civil Defence. The Civil Defence written examinations and license shall be based on the training and certification provided by the system manufacturer to install manufacturer's products as per specified listed system requirements.



#### 4.4.7. Inspection

- 4.4.7.1. Special inspections shall be required for all façade and cladding systems. Inspection shall take place in successive stages as installation proceeds. Such successive stages shall be at every 20% intervals of the total building height.
- 4.4.7.2. It is consultant's responsibility to ensure that installer's work is inspected during construction and installation at each stage.
- 4.4.7.3. It is consultant's responsibility to recruit in-house qualified façade engineers for inspections or to hire façade inspection services of Civil Defence approved House of Expertise.
- 4.4.7.4. Main consultant or house of expertise, who inspect the installation, shall certify and signoff the façade and cladding installations undertaken during progressive inspections at each successive stage of installations in report which shall be part of the documentation required by Civil Defence during final inspection and handing over.
- 4.4.7.5. Main consultant or Civil Defence approved House of Expertise individual inspector undertaking Façade inspections shall have the following qualifications.
  - a. Accreditation to ISO/IEC 17020 or relevant IAS criteria or ICC Specialist building inspection training and certification or an equivalent international criteria acceptable to Municipality and Civil Defence.
  - b. Training and certification by system manufacturers.
  - c. 3 years experience in fire and life safety aspects of Façade inspections.

#### 4.4.8. Façade Specialist Qualifications

- 4.4.8.1. The Façade Specialists of Consultant's in-house team or of Civil Defence approved House of Expertise, undertaking façade consultancy, design or inspection shall have the following qualifications.
  - a. Bachelor's degree in engineering.
  - b. 5 years experience in fire and life safety aspects of Façade engineering.
  - c. Training and certification by system manufacturers.
- 4.4.8.2. The Façade Specialists of Consultant's in-house team or of Civil Defence approved House of Expertise, undertaking façade consultancy, design or inspection shall be certified by Civil Defence based on their qualifications as required by **Section 4.4.8.1.**, manufacturer's training certifications and written examination.



## 4.5. General Requirements for Exterior Façade Systems

### 4.5.1. Coatings on primary substrate

- 4.5.1.1. Bitumen, bituminous products and flammable agents as anti-corrosion or water-proofing coatings shall not be applied on primary substrates, either on metals or concrete. Bitumen has fire point of 175<sup>0</sup>C and propagates building envelope fires.

### 4.5.2. Building Fire Rating

- 4.5.2.1. Façade materials, exterior wall systems, claddings and insulation installed on any building shall not reduce the fire resistance rating of the exterior wall where required by other sections of this Chapter.

### 4.5.3. Thermal Barrier

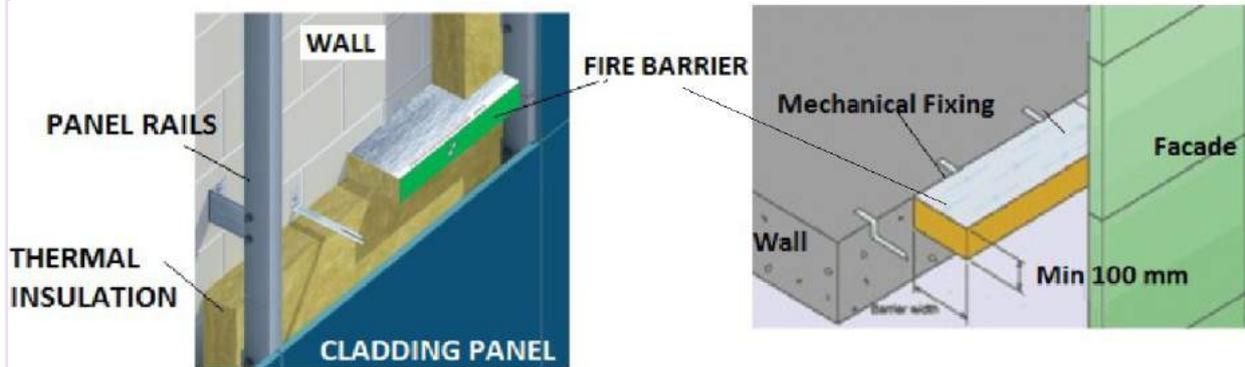
- 4.5.3.1. Façade Cladding Materials such as MCM and ACP shall be completely separated from the building interior and plenum by a thermal barrier, complying to test standards of **Section 7.1.11.** of this chapter.
- 4.5.3.2. Required thermal barriers shall not be installed on the walls or frames with adhesives alone. Thermal barriers shall be fixed mechanically on primary substrate, structural frame or the wall or on rails as appropriate.
- 4.5.3.3. Thermal barrier is not mandatory only when MCM or ACP or cladding materials are used on balconies and minor architectural appendages on exterior wall.
- 4.5.3.4. In all cases the Building Exterior Base wall must be imperforate and provide a nominal 15 minutes fire resistance ( Insulation and integrity).

### 4.5.4. Cavity Fire Barrier

- 4.5.4.1. Cavity Fire Barriers shall be incorporated into façade designs, including architectural features with uninterrupted vertical columns (e.g. High Rise 'Fins'), at every floor horizontally around window openings on all sides to limit fire breakout from a room into the adjacent cavity. This cavity barrier shall not be a thermal bridge.
- 4.5.4.2. Cavity Fire Barriers shall be incorporated into façade design at every floor vertically to restrict flame within continuous cavities or where cavities bridge the perimeter firestopping. Perimeter Firestopping systems shall be installed as per **Section 3** of this chapter.
- 4.5.4.3. Cavity fire barrier shall be of Non combustible material, in accordance with **Section 7.1.45.** of this chapter.
- 4.5.4.4. The cavity fire barrier shall be 100 mm high and, where the thermal insulation is not of equivalent fire resistance to the cavity barrier, shall run through insulation horizontally at each floor level and vertically on each face of façade as required by **Section 4.5.4.2.**



- 4.5.4.5. The installation shall ensure that compartmentation is established between the façade skin and the primary substrate and no cavity exists for fire to pass through. See **figures 1.19.a and figure 1.19.b.**
- 4.5.4.6. The cavity fire barrier shall be mechanically bonded to the primary substrate or structural frame and extended or compressed behind the finish façade panel to ensure that no fire path are created between the barrier and substrate or external façade panel.
- 4.5.4.7. Where cavity is necessary part of ventilated façade design and cavity needs to be maintained, an intumescent system, approved and listed for the purpose shall be fixed as cavity fire barrier band. These intumescent bands serve as fire barriers when exposed to flames and shall expand to seal the gaps.



CAVITY FIRE BARRIERS FOR ILLUSTRATION

#### 4.5.5. Fire Breaks

- 4.5.5.1. It is highly recommended to provide “fire breaks” where cladding materials are installed on exterior façade by restricting the vertical length of building envelope of cladding materials to not more than 15 m, followed by 6 m of non-combustible material as envelope finish such as concrete or tiles or materials approved as per **Section 7.1.45.** , in an alternative manner along the building envelope’s face.



#### 4.5.6. Groove Sealants, Gaskets, Backer Rod and vapour barrier systems

- 4.5.6.1.** Use of flammable silicon or fillers or non rated groove sealants, materials in between panel joints is not permitted unless these joint fillers are tested as per **Section 7.1.45** and part of their full wall assembly and were used in achieving “pass criteria” as the Wall Assembly “Large Scale Tests”. See **figures 1.19.a and figure 1.19.b**.
- 4.5.6.2. Vapour Barrier systems (VBS) and membranes** are generally provided to resist water vapour and are often an essential part of the façade system. Vapour barriers, particularly rubber, bituminous based materials, maybe combustible by their nature and may affect the overall performance of the façade system in respect of fire development and spread. Therefore the VBS product should be checked against the MSDS for base content (**See Section 4.5.1.1**). VBS products must be registered and Licensed by the Civil Defence and must achieve EN13501-1 Class A as per **Section 7.1.45**.
- 4.5.6.3. EPDM products, Rubber sheeting and architectural carpets** are creating new design possibilities as building skins. EPDM rubber (ethylene propylene diene monomer rubber) and similar rubber products must not be used as a full VBS/Façade Liner. However it is acceptable in other discrete locations, such as Curtain Wall Gaskets or window waterproofing provided the fire performance achieves a minimum of EN 13501-1 C, S2,d0., as per **Section 7.1.45**.
- 4.5.6.4. Artificial turf** has been typically used for sports grounds or indoor solutions, but now this surface covering is being used in the design of indoor and outdoor spaces in horizontal and vertical applications. Where such applications are used as floor coverings they shall be tested to EN 13501-1 and achieve a minimum of Cfl,S1 where the premises are provided with a sprinkler system or, with the exception of areas being used for Assembly, where the installation is completely out doors. Where the material is being used as an internal wall covering it must comply with **Section 7.1.4**. or when proposed as an External wall covering, it shall comply with the requirements of chapter 1 Section 4, achieve ASTM E84 class A and EN13501-1 Class A2 minimum. The Façade system which the material forms a part must also be tested to NFPA 285 and NFPA 268 ( ‘no ignition at 12.5 kw/m<sup>2</sup> at 20 minutes)

#### 4.5.7. Openings (Window, Doors, Ventilation) Flashing

- 4.5.7.1.** Window (opening) flashing where cladding materials intersect shall be of steel formed and fixed mechanically or an appropriate and Civil Defence approved Fire Stopping/safing system fire to completely line windows or openings and overlap onto both exterior and interior surfaces of wall assembly. It must be ensured that any void or cavity between the exterior and interior surfaces of the façade system is protected to prevent fire accessing the space. See **figures 1.19.a and figure 1.19.b**.



#### 4.5.8. Architectural features

- 4.5.8.1.** Architectural features shall comply to all the relevant requirements of **Section 4.**

#### 4.5.9. Openings on the exterior walls

- 4.5.9.1.** Openings on exterior walls in adjacent stories shall be separated vertically to protect against fire spread on the exterior of the buildings where the openings are within 1524 mm of each other horizontally. Such openings shall be separated vertically not less than 914 mm by spandrel girders, exterior walls or other similar assemblies that have a fire-resistance rating of not less than 1 hour, rated for exposure to fire from both sides, or by flame barriers that extend horizontally not less than 762 mm beyond the exterior wall. Flame barriers shall have a fire resistance rating of not less than 1 hour.
- 4.5.9.2.** Where a Spandrel Panel is used to satisfy the requirement in **Section 4.5.9.1.**, it shall be ensured that the materials used and spandrel panel as system provides a minimum of 60 minutes fire resistance from BOTH sides of the panel. All transoms and Mullions must be protected in this respect.
- 4.5.9.3.** Fire safing forming the perimeter edge protection must ensure the same performance as the structural floor slab in respect of F and T ratings.
- 4.5.9.3.** Aluminium Back Pans shall not be accepted.

#### 4.5.10. Installation of Exterior Façade Lighting

- 4.5.10.1.** Façade lighting fixtures have high intensity light and heat. When over heated or poorly installed, these fixtures emit intense heat and can be cause of fire ignition source when in contact with readily combustible materials.
- 4.5.10.2.** Flood Lighting fixtures shall not be installed directly on façade surface, wood, plastic, insulation, façade cavity with combustible material etc. Flood lighting fixtures shall be installed such that lighting fixture heat is not dissipated directly onto the façade surface. Appropriate steel framing and non combustible thermal insulation shall separate the lighting fixtures from façade surface.



#### 4.5.11. Installation of Electrical Equipment on Façade

- 4.5.11.1. Installation of electrical equipment such as Air Conditioning units, Kitchen Exhaust ducts, Heaters, Boilers, Diesel generators directly in contact with Façade surface can be source of fire ignition.
- 4.5.11.2. Poor installation, poor wiring and overheating of such electrical equipment and its contact with combustible insulation or façade material shall be avoided. Electrical equipment shall be separated from façade surface with proper steel frames, steel lining, metal conduit for wiring and non combustible insulation coverings.
- 4.5.11.3. Façade cavity shall not be used for routing electrical cabling, LPG or natural gas piping and hot water piping.
- 4.5.11.3. Regular maintenance of the electrical equipment shall be ensured to keep the equipment in good working condition.

#### 4.5.12. Installation of Advertising Banners and Hoardings on Façade

- 4.5.12.1. Installation of non approved advertising billboard material on approved façade material can compromise the exterior wall's safety.
- 4.5.12.2. Sign boards, billboards, advertising banners shall comply with **Table 1.9.56**.
- 4.5.12.2. Flammable, Combustible, Plastic and Foam materials shall not be used for advertising or billboard on façade envelope.

#### 4.5.13. Housekeeping

- 4.5.13.1. Competent house keeping shall be ensured in every building to keep exterior or façade surface clean and free from flammable and combustible materials within the vicinity. Trash accumulation near façade surface shall be avoided. Trash cans shall not be placed adjacent to exterior façade surface.

### Cigarette butt caused 'Tamweel Tower fire'

Police report shows careless smoker set tower alight leaving hundreds homeless



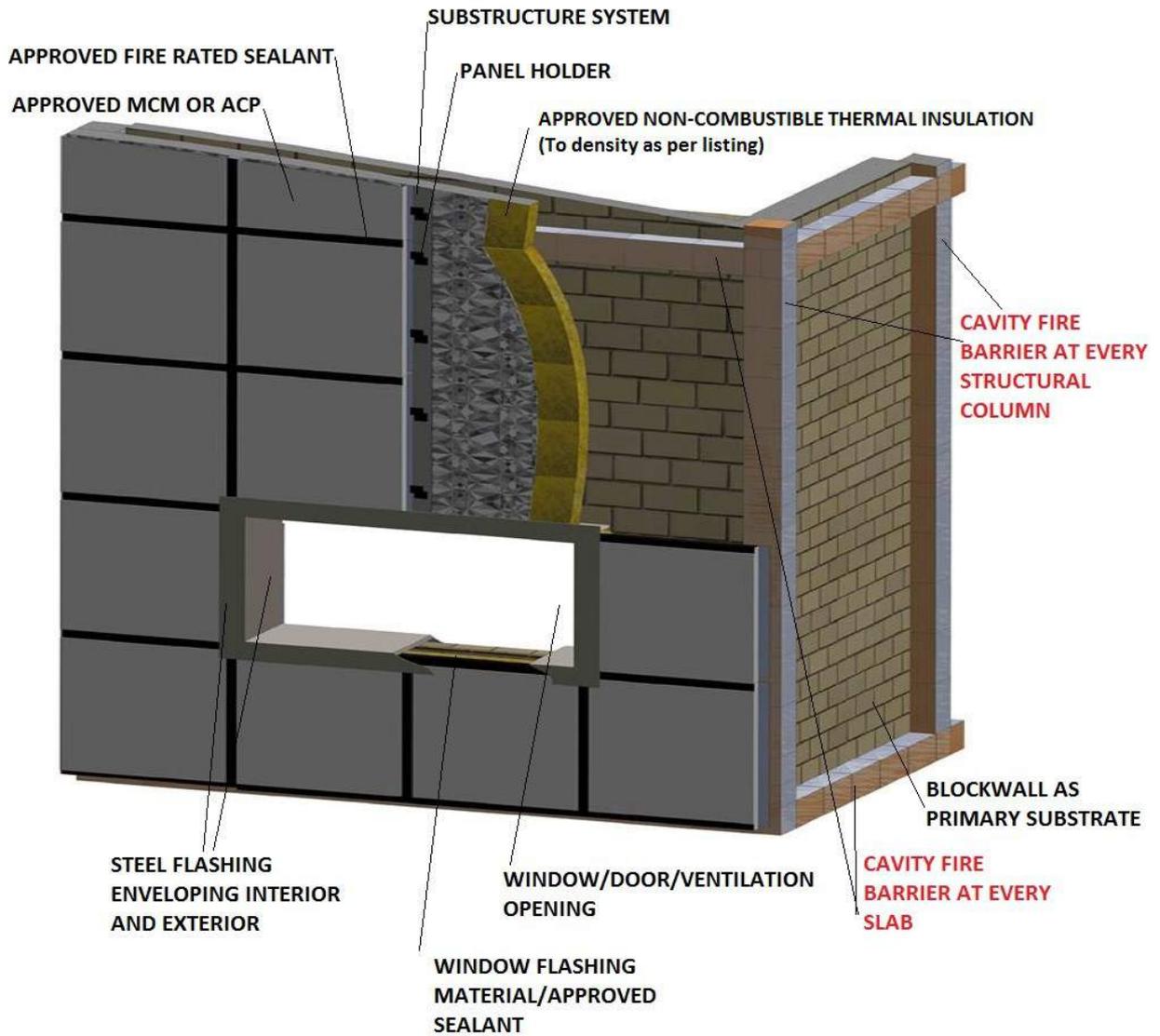


Figure 1.19.a.: Typical MCM / ACP Installation on Block wall

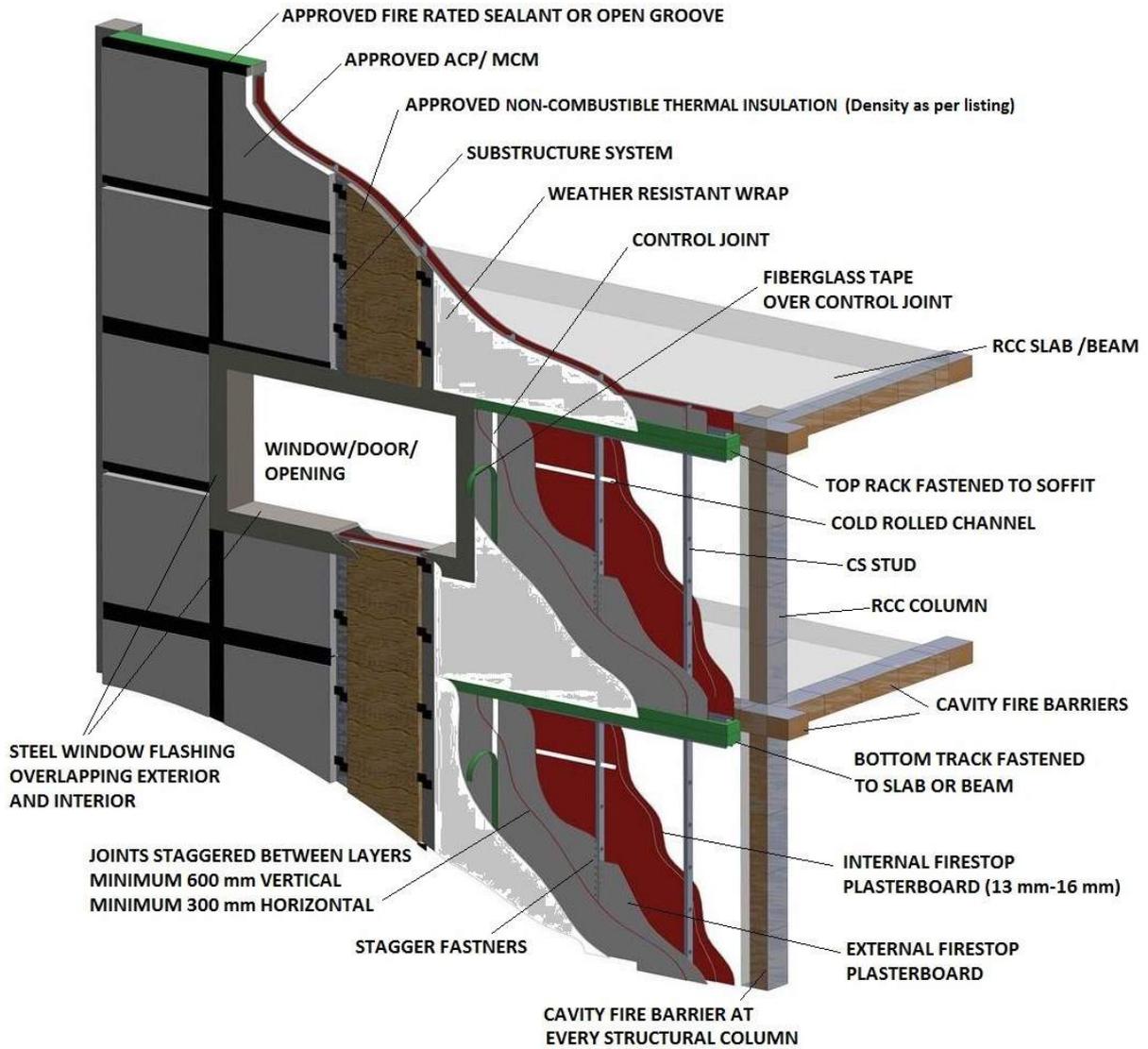


Figure 1.19.b.: Typical MCM / ACP Installation on Frame

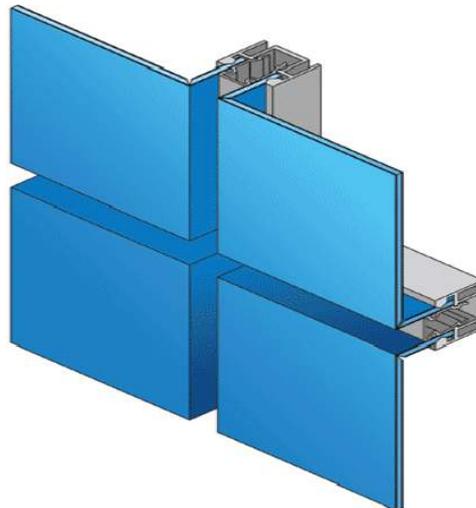


## 4.6. Metal Composite Materials and Panels (MCM, ACP)

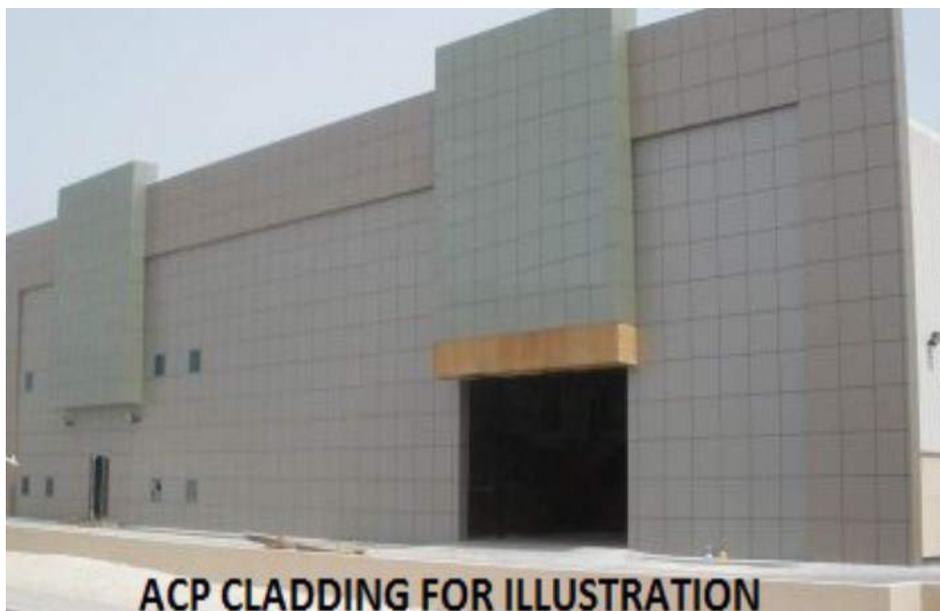
**4.6.1.** Metal Composite Panels (such as Aluminium Composite Panels, ACP), other than sandwich panels used on façade and exterior wall assembly shall comply with general requirements of **Section 4.5** and the specific requirements of **Section 4.6**.

### 4.6.2. Definition

**4.6.2.1.** A factory manufactured panel consisting of metal skins bonded to both faces of a “core”. All MCM’s shall be tested and approved at the maximum thickness intended for use and intended assemblies. However, MCM’s (Such as ACP’s) shall have a minimum exterior skin thickness of 0.019 in. (0.5 mm), a minimum interior skin thickness of 0.010 in. (0.25 mm) and a maximum panel thickness of ¼ in. (6.3 mm) where installed on facades and exterior walls.



**MCM/ACP FOR ILLUSTRATION**



**ACP CLADDING FOR ILLUSTRATION**



### 4.6.3. Specific Requirements

- 4.6.3.1.** MCM/ACP shall be permitted to be installed on the façade and exterior of buildings classified as Type I, Type II, Type III, or Type IV construction, as defined in **Chapter 1, Table 1.7.**, and such installation shall not change the construction classification or fire performance of the building.
- 4.6.3.2.** MCM/ACPs shall be Marked/labeled to verify its certification mark from accredited certification body.
- 4.6.3.3.** MCM/ACP Core shall not be of foam plastic insulation or LDPE (Low Density Polyethylene) or any such expanded plastic having density less than 320 kg/m<sup>3</sup>.
- 4.6.3.4.** MCM/ACP Core shall be tested and evaluated separately. Core (exposed without skin) used in Cladding and façade Panels can be of plastic or mineral or combination of such material having flame and smoke spread characteristics as per **TEST 1** in accordance with **Table 1.14.a. and Table 1.14.b.** test requirements.
- 4.6.3.5.** The fire resistance performance of Fire Rated façade system is a function of the base exterior wall when tested to ASTM E119 (or equivalent) and NOT only the MCM/ACP panel element. It must be made clear by the MCM/ACP manufacturer that their products have no Resistance to Fire qualities when tested as a system in accordance with **Table 1.14.b.** unless the MCM/ACP panel has been tested as an individual component product to ASTM E119.

### 4.6.4. Test Certifications

- 4.6.4.1.** MCM/ACP panels and facade systems on non-fire resistance rated and non load bearing exterior wall coverings shall comply with **Table 1.14.a.**
- 4.6.4.2.** MCM/ACP panels and facade systems on fire resistance rated exterior and non-load bearing wall assembly coverings shall comply with **Table 1.14.b.**

### 4.6.5. Application

- 4.6.6.1.** The occupancies and type of buildings that are allowed to have MCM or ACP shall be in accordance with **Table 1.14.a.** and **Table 1.14.b.**



**Table 1.14.a.: MCM and ACP On Non-Fire Resistance rated and Non-Load bearing Exterior wall coverings-Test Requirements**

| OCCUPANCY AND TYPE OF BUILDING   | TEST 1<br>MCM/ ACP CORE AND PANEL AS PRODUCT   | TEST 2<br>MCM/ ACP PANELS WITH WALL ASSEMBLY   |
|--|--|--|
| <p>1. SUPER HIGHRISE BUILDING</p> <p>2. HIGHRISE BUILDING</p> <p>3. MALLS</p> <p>4. THEME PARKS</p> <p>5. SCHOOLS</p> <p>6. HOSPITALS</p> <p>7. ASSEMBLY</p> | <p>i. Core shall be tested to the criteria iii and iv.</p> <p>ii. Panel shall be tested with the thickness intended to the criteria iii and iv.</p> <p>iii. EN 13501-1<br/>With pass criteria A1 OR A2-s1-d0</p> <p>AND</p> <p>iv. ASTM D1929<br/>MCM/ACP shall have self ignition temperature of not less than 343°C.</p> | <p>v. BS 8414 –1 Or 2<br/>With pass criteria as per BRE 135</p> <p>OR</p> <p>vi. NFPA 285<br/>With pass criteria “Pass”</p> <p>OR</p> <p>vii. FM 4881<br/>With pass criteria “Pass”</p> <p>OR</p> <p>viii. ISO 13785-2<br/>With pass criteria “Pass”</p> |
| <p>8. LOWRISE BUILDING</p> <p>9. MIDRISE BUILDING</p> <p>10. WAREHOUSE</p> <p>11. INDUSTRIAL</p>   | <p>i. Core shall be tested to the criteria iii and iv.</p> <p>ii. Panel shall be tested with the thickness intended to the criteria iii and iv.</p> <p>iii. EN 13501-1<br/>With pass criteria B-s1-d0</p> <p>AND</p> <p>iv. ASTM D1929<br/>MCM/ACP shall have self ignition temperature of not less than 343°C.</p>        | <p>v. BS 8414 –1 Or 2<br/>With pass criteria as per BRE 135</p> <p>OR</p> <p>vi. NFPA 285<br/>With pass criteria “Pass”</p> <p>OR</p> <p>vii. FM 4881<br/>With pass criteria “Pass”</p> <p>OR</p> <p>viii. ISO 13785-2<br/>With pass criteria “Pass”</p> |



**Table 1.14.b.: MCM and ACP on Fire Resistance rated Exterior wall coverings-Test Requirements**

| OCCUPANCY AND TYPE OF BUILDING  | TEST 1<br>MCM/ ACP CORE AND PANEL AS PRODUCT  | TEST 2<br>MCM/ ACP PANELS IN WALL ASSEMBLY  |
|---|---|---|
| <p><b>1. ANY BUILDING WITH ANY HEIGHT AND ANY OCCUPANCY HAVING REQUIREMENT OF FIRE RESISTANCE RATED EXTERIOR WALL CONSTRUCTION, WHERE REQUIRED BY OTHER SECTIONS OF THIS CHAPTER.</b></p> | <p>i. Core shall be tested to the criteria iii and iv.<br/>           ii. Panel shall be tested with the thickness intended to the criteria iii and iv.<br/><br/>           iii. EN 13501-1<br/>           With pass criteria A1 OR A2-s1-d0<br/><br/>           AND<br/><br/>           iv. ASTM D1929<br/>           MCM/ACP shall have self ignition temperature of not less than 343°C.</p> | <p>v. ASTM E 119<br/>           With pass criteria "1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.<br/><br/>           OR<br/><br/>           vi. UL 263<br/>           With pass criteria "1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.<br/><br/>           OR<br/><br/>           vii. EN 1362-3<br/>           With pass criteria "1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.<br/><br/>           OR<br/><br/>           viii. EN 1362-4<br/>           With pass criteria "1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.</p> |

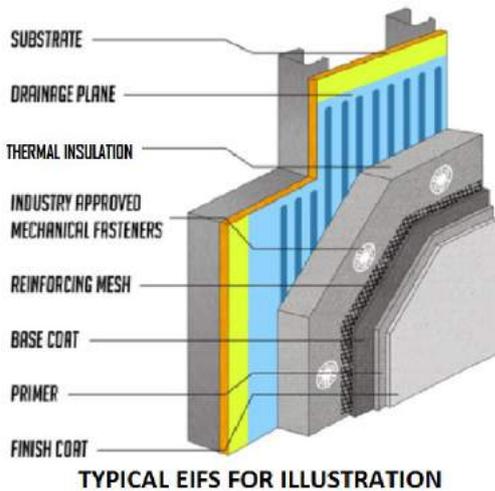


## 4.7. Exterior Insulation and Finish Systems (EIFS) and External Thermal Insulation Composite System (ETICS)

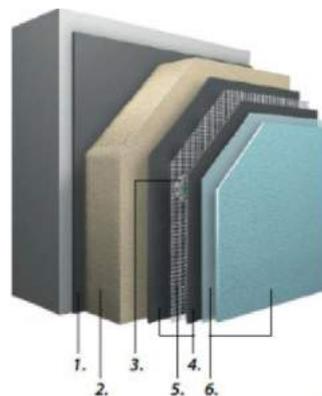
**4.7.1.** Exterior Insulation and Finish Systems (EIFS) and External Thermal Insulation Composite System (ETICS) used on façade and exterior wall assembly shall comply with general requirements of **Section 4.5** and the specific requirements of **Section 4.7**.

### 4.7.2. Definition

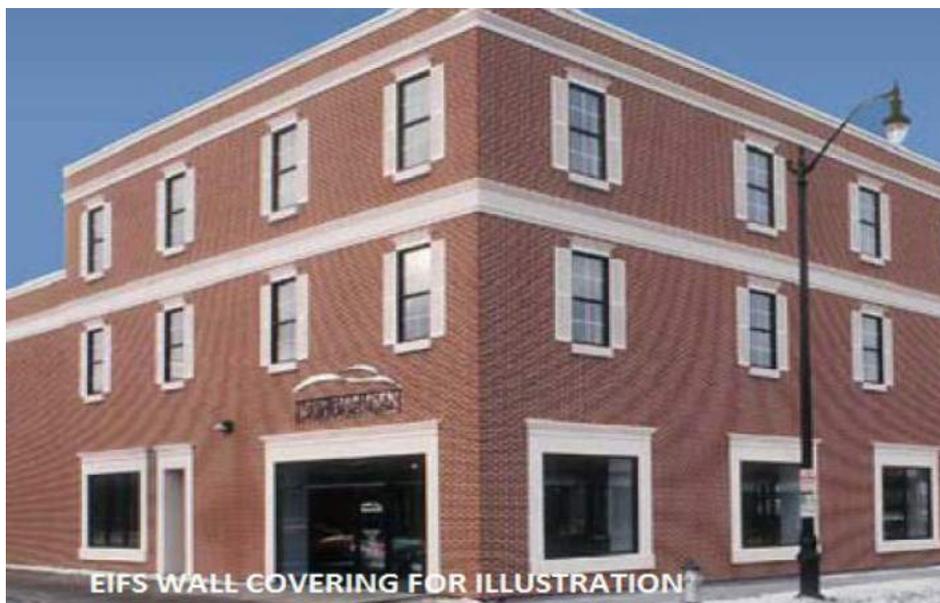
**4.7.2.1.** Exterior insulation and finish systems (EIFS) are materials, assemblies made up of layers of foam plastic insulation or expanded polystyrene or mineral insulation with adhesives and fiber reinforcement, used in exterior non load bearing walls as wall coverings and exterior cladding systems



**TYPICAL EIFS FOR ILLUSTRATION**



**TYPICAL ETICS FOR ILLUSTRATION**





### 4.7.3. Specific Requirements

- 4.7.3.1. EIFS and ETICS shall be constructed such that it meets the performance characteristics required as per ASTM E 2568.
- 4.7.3.2. EIFS and ETICS shall be certified and listed by a third party independent testing and Certification body, approved by Civil Defence.
- 4.7.3.3. EIFS and ETICS shall be Marked/labeled to verify its certification mark from accredited certification body.
- 4.7.3.4. The layers and core materials shall be tested separately and entire assembly including ornaments, trims and moldings' with intended thickness, joints, seams, fasteners and wall arrangement shall be tested in accordance with **Table 1.15.a**.
- 4.7.3.5. Where EIFS or ETICS is installed on Fire rated or load bearing walls, the wall arrangement shall be tested in accordance with **Table 1.15.b**.
- 4.7.3.6. EIFS shall be specified in accordance with ANSI/EIMA 99-A (Latest Edition) 'American National Standard for EIFS'. ETICS shall meet the performance requirements as per ETAG 004 (Latest Edition) 'Guidelines for European Technical Approval of ETICS with Rendering'
- 4.7.3.7. Requirements of the ANSI/EIMA 99-A or ETAG 004 guidelines shall be followed independently. Using parts from each of the guidelines is not permitted.

### 4.7.4. Test Certifications

- 4.7.4.1. EIFS and ETICS panels and facade systems on non-fire resistance rated and non load bearing exterior wall coverings shall comply with **Table 1.15.a**.
- 4.7.4.2. EIFS and ETICS panels and facade systems on fire resistance rated exterior wall assembly coverings shall comply with **Table 1.15.b**.

### 4.7.5. Application

- 4.6.6.1. The occupancies and type of buildings that are allowed to have EIFS and ETICS shall be in accordance with **Table 1.15.a** and **Table 1.15.b**.

## Points to Ponder

**Governments all over the world advocate usage of green building products, which contribute to high energy efficient performances of buildings and reduce the carbon footprints.**

**However, there is a conflict when these sustainable building products are challenged with their fire resistance performance.**



**Table 1.15.a.: EIFS and ETICS on Non-Fire Resistance rated and Non-Load bearing Exterior wall coverings-Test Requirements**

| OCCUPANCY AND TYPE OF BUILDING   | TEST 1<br>EIFS/ETICS COMPONENTS AND PANEL AS PRODUCT   | TEST 2<br>EIFS/ETICS AS WALL ASSEMBLY  |
|--|--|--|
| <p>1. ANY BUILDING</p> <p>2. ANY INSTALLATION</p> <p>3. ANY AESTHETICS</p> | <p>i. All components of the EIFS (All layers including EPS/ XPS, coating, insulation, mesh, adhesive and finish.) shall be class A (Flame spread 0-25, Smoke development 0-450) when individually tested to ASTM E 84 or UL 723</p> <p>AND</p> <p>ii. NFPA 268<br/>With pass criteria "No Ignition at 12.5 kw/m<sup>2</sup> at 20 minutes"</p> | <p>iii. BS 8414 –1 Or 2<br/>With pass criteria as per BRE 135</p> <p>OR</p> <p>iv. NFPA 285<br/>With pass criteria "Pass"</p> <p>OR</p> <p>v. FM 4881<br/>With pass criteria "Pass"</p> <p>OR</p> <p>vi. ISO 13785-2<br/>With pass criteria "Pass"</p> |



**Table 1.15.b.: EIFS and ETICS on Fire Resistance rated Exterior wall coverings-Test Requirements**

| OCCUPANCY AND TYPE OF BUILDING   | TEST 1<br>EIFS/ETICS COMPONENTS AND PANEL AS PRODUCT  | TEST 2<br>EIFS/ETICS AS WALL ASSEMBLY   |
|--|---|---|
| <p>1. ANY BUILDING</p> <p>2. ANY INSTALLATION</p> <p>3. ANY AESTHETICS</p> | <p>i. All components of the EIFS (All layers including coating, insulation, mesh, adhesive and finish.) shall be class A when individually tested to ASTM E 84 or UL 723</p> <p>AND</p> <p>ii. NFPA 268<br/>With pass criteria<br/>"No Ignition at 12.5 kw/m<sup>2</sup> at 20 minutes"</p> | <p>iii. ASTM E 119<br/>With pass criteria<br/>"1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.</p> <p>OR</p> <p>iv. UL 263<br/>With pass criteria<br/>"1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.</p> <p>OR</p> <p>v. EN 1362-3<br/>With pass criteria<br/>"1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.</p> <p>OR</p> <p>vi. EN 1362-4<br/>With pass criteria<br/>"1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.</p> |

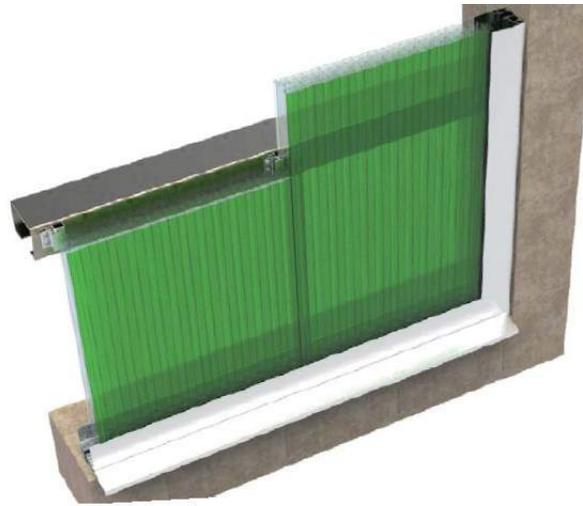


## 4.8. Polycarbonate External Wall and Façade System (PEWFS)

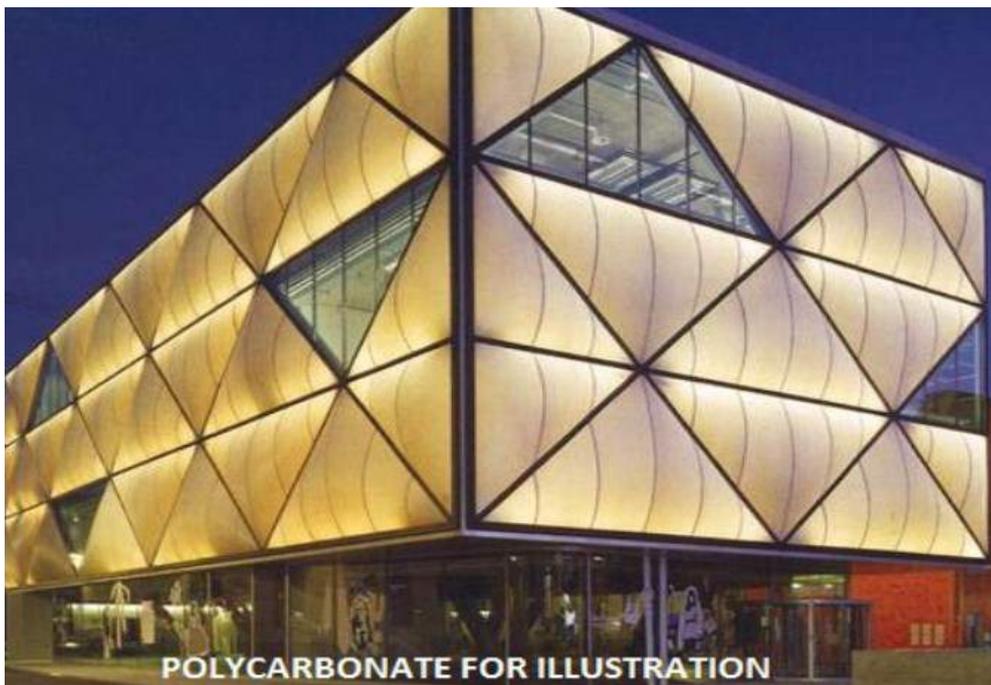
**4.8.1.** Polycarbonate External Wall and Façade System (PEWFS) used on façade and exterior wall assembly shall comply with general requirements of **Section 4.5** and the specific requirements of **Section 4.8**.

### 4.8.2. Definition

**4.8.2.1.** Polycarbonate is a type of thermoplastic, a polymer that becomes pliable or moldable above a specific temperature and returns to a solid state on cooling. Polycarbonate is an engineering thermoplastics.



**PEWFS FOR ILLUSTRATION**



**POLYCARBONATE FOR ILLUSTRATION**



### 4.8.3. Specific Requirements

- 4.8.3.1. PEWFS shall be certified and listed by a third party independent Testing and Certification body, approved by Civil Defence.
- 4.8.3.2. PEWFS shall be Marked/labeled to verify its certification mark from accredited certification body.
- 4.8.3.3. The entire assembly including ornaments, trims and moldings with intended thickness, joints, seams, fasteners and wall arrangement shall be tested in accordance with **Table 1.16.a**.

### 4.8.4. Test Certifications

- 4.8.4.1. PEWFS panels and facade systems on non-fire resistance rated and non load bearing exterior wall coverings shall comply with **Table 1.16.a**.
- 4.8.4.2. EIFS and ETICS panels and facade systems on fire resistance rated exterior wall assembly coverings shall comply with **Table 1.16.b**.

### 4.8.5. Application

- 4.8.5.1. The occupancies and type of buildings that are allowed to have PEWFS shall be in accordance with **Table 1.16.a** and **Table 1.16.b**.



**Table 1.16.a.: PEWFS on Non-Fire Resistance rated and Non-Load bearing Exterior wall coverings- Test Requirements**

| OCCUPANCY AND TYPE OF BUILDING   | TEST 1<br>PEWFS PANEL AS PRODUCT   | TEST 2<br>PEWFS AS WALL ASSEMBLY   |
|--|--|--|
| <p>1. SUPER HIGHRISE BUILDING</p> <p>2. HIGHRISE BUILDING</p> <p>3. MALLS</p> <p>4. THEME PARKS</p> <p>5. SCHOOLS</p> <p>6. HOSPITALS</p> <p>7. ASSEMBLY</p> | <p>i. EN 13501-1<br/>With pass criteria<br/>A1 OR A2-s1-d0</p> <p>AND</p> <p>ii. ASTM D1929<br/>With pass criteria<br/>PEWFS shall have self ignition temperature of not less than 343°C</p> | <p>iii. BS 8414 –1 Or 2<br/>With pass criteria<br/>as per BRE 135</p> <p>OR</p> <p>iv. NFPA 285<br/>With pass criteria<br/>“Pass”</p> <p>OR</p> <p>v. FM 4881<br/>With pass criteria<br/>“Pass”</p> <p>OR</p> <p>vi. ISO 13785-2<br/>With pass criteria<br/>“Pass”</p> |
| <p>8. LOWRISE BUILDING</p> <p>9. MIDRISE BUILDING</p> <p>10. WAREHOUSE</p> <p>11. INDUSTRIAL</p>   | <p>i. EN 13501-1<br/>With pass criteria<br/>B-s1-d0</p> <p>AND</p> <p>ii. ASTM D1929<br/>With pass criteria<br/>PEWFS shall have self ignition temperature of not less than 343°C</p>        | <p>iii. BS 8414 –1 Or 2<br/>With pass criteria<br/>as per BRE 135</p> <p>OR</p> <p>iv. NFPA 285<br/>With pass criteria<br/>“Pass”</p> <p>OR</p> <p>v. FM 4881<br/>With pass criteria<br/>“Pass”</p> <p>OR</p> <p>vi. ISO 13785-2<br/>With pass criteria<br/>“Pass”</p> |



**Table 1.16.b.: PEWFS on Fire Resistance rated Exterior wall -Test Requirements**

| OCCUPANCY AND TYPE OF BUILDING   | TEST 1<br>PEWFS PANEL AS PRODUCT   | TEST 2<br>PEWFS IN WALL ASSEMBLY  |
|--|--|---|
| <p>1. ANY BUILDING</p> <p>2. ANY INSTALLATION</p> <p>3. ANY AESTHETICS</p> | <p>i. EN 13501-1<br/>With pass criteria<br/>A1 OR A2-s1-d0</p> <p>AND</p> <p>ii. ASTM D1929<br/>With pass criteria<br/>PEWFS shall have self ignition temperature of not less than 343°C</p> | <p>iii. ASTM E 119<br/>With pass criteria<br/>"1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.</p> <p>OR</p> <p>iv. UL 263<br/>With pass criteria<br/>"1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.</p> <p>OR</p> <p>v. EN 1362-3<br/>With pass criteria<br/>"1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.</p> <p>OR</p> <p>vi. EN 1362-4<br/>With pass criteria<br/>"1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.</p> |



## 4.9. Sandwich Panels

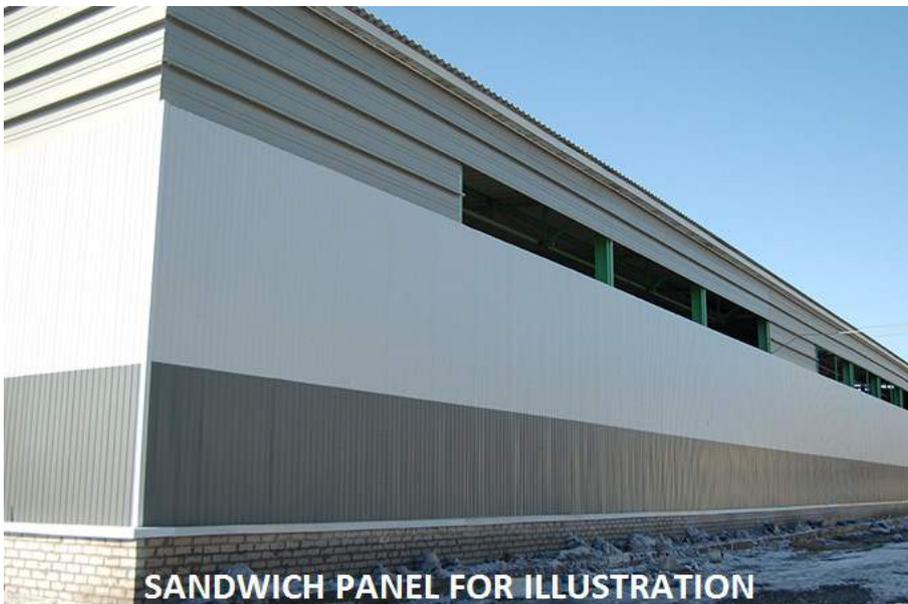
- 4.9.1.** Sandwich Panels shall comply with general requirements of **Section 4.5**, where used on façade and exterior wall and the specific requirements of **Section 4.9**.
- 4.9.2.** Sandwich Panels used in other applications such as internal partitions, cold storage or roofing shall comply with the specific requirements of **Section 4.9**.
- 4.9.3.** Sandwich panels shall be tested for the intended applications such as external, internal, roofing or cold storages and shall not be interchanged in their end applications.

### 4.9.4. Definition

- 4.9.4.1.** Sandwich panels are foam plastic insulated sandwich panels (FISP) or mineral core insulated panels or self supporting double skin metal faced insulating panels.



**INSULATED SANDWICH PANEL FOR ILLUSTRATION**



**SANDWICH PANEL FOR ILLUSTRATION**



- 4.9.4.2.** Generally cores used in the sandwich panels based on their intended application are Polyisocyanurate Foam (PIR), Polyurethane Foam (PUR), Expanded or Extruded Polystyrene (EPS and EXPS) or Non-combustible mineral wool or fiberglass.
- 4.9.4.3.** Sandwich panels are generally used as external wall systems in low rise building such as warehouses and roofing. As internal partitions and ceiling applications, sandwich panels are used in, cold storages, food industries, warehouses and industries.

#### **4.9.5. Specific Requirements**

- 4.9.5.1.** Where Sandwich panels are installed on the exterior walls, they shall not reduce the fire resistance rating of the wall.
- 4.9.5.2.** Sandwich panels shall be Marked/labeled to verify its certification mark from accredited certification laboratory with its intended end use and application (Such as Internal wall, External wall, cold storage, roofing etc.), in compliance with this code.
- 4.9.5.3.** Sandwich panels installed as exterior walls shall be completely separated from the building interior and plenum by a thermal barrier, complying to test standards of **Section 7.1.11.** of this chapter.
- 4.9.5.4.** Thermal barrier shall not be required in masonry or concrete wall, floor or roof constructions where the sandwich panel is covered on each face by concrete or masonry with a minimum thickness of 25 mm.
- 4.9.5.5.** Thermal barrier shall not be required in fully Sprinkler protected cooler or freezer or cold rooms and the rooms they are located in, when sandwich panel is minimum 4 inch thick and has Class A rating as per UL 723 or ASTM E 84 (FSI-25, SDI-450 or less), when tested both core and panel. Moreover, sandwich panel shall have self ignition temperature, not less than 427<sup>0</sup>C in accordance with ASTM D 1929.
- 4.9.5.6.** Thermal barrier shall not be required in roof assemblies where sandwich panels are separated from the interior of the building by wood structural sheathing not less than 12 mm in thickness. And the sandwich panel is part of roof covering assembly tested and passes with FM 4450 or UL 1256 or FM 4471.
- 4.9.5.7.** Foam plastic insulation, exterior facings and coatings shall be tested separately in the thickness of intended use as per **Table 1.17.c.**



#### 4.9.6. Test Certifications

- 4.9.6.1. Sandwich panels shall be permitted to be installed as exterior walls when tested in accordance with **Table 1.17.a.**
- 4.9.6.2. Sandwich panels as fire resistance rated exterior wall assembly coverings shall comply with both **Table 1.17.a.** and **Table 1.17.b.**
- 4.9.6.3. Sandwich panels used in applications other than as exterior walls shall comply with test requirements in accordance with **Table 1.17.c.**

#### 4.9.7. Application

- 4.9.7.1. The occupancies and type of buildings that are allowed to have sandwich panels in their exterior wall facades shall be in accordance with **Table 1.17.a.** and **Table 1.17.b.**



**Table 1.17.a.: Sandwich Panels on Non-Fire Resistance rated and Non-Load bearing Exterior wall coverings-Test Requirements**

| OCCUPANCY AND TYPE OF BUILDING   | TEST 1<br>SANDWICH PANEL AS PRODUCT   | TEST 2<br>SANDWICH PANEL IN WALL ASSEMBLY  |
|--|---|--|
| <p>1. SUPER HIGHRISE BUILDING</p> <p>2. HIGHRISE BUILDING</p> <p>3. MALLS</p> <p>4. THEME PARKS</p> <p>5. SCHOOLS</p> <p>6. HOSPITALS</p> <p>7. ASSEMBLY</p> | <p>i. Core shall be tested to the criteria iii and iv.</p> <p>ii. Panel shall be tested with the thickness intended to the criteria iii and iv.</p> <p>iii. EN 13501-1<br/>With pass criteria A OR A2-s1-d0</p> <p>AND</p> <p>iv. ASTM D1929<br/>With pass criteria PEWFS shall have self ignition temperature of not less than 343°C.</p>  | <p>v. BS 8414 –1 Or 2<br/>With pass criteria as per BRE 135</p> <p>OR</p> <p>vi. NFPA 285<br/>With pass criteria “Pass”</p> <p>OR</p> <p>vii. FM 4881<br/>With pass criteria “Class 1”</p> <p>OR</p> <p>viii. ISO 13785-2<br/>With pass criteria “Pass”</p>  |
| <p>8. LOWRISE BUILDING</p> <p>9. MIDRISE BUILDING</p> <p>10. WAREHOUSE</p> <p>11. INDUSTRIAL</p>   | <p>i. Core shall be tested to the criteria iii or iv and v.</p> <p>ii. Panel shall be tested with the thickness intended to the criteria iii or iv and v.</p> <p>iii. EN 13501-1<br/>With pass criteria B-s1-d0</p> <p>OR</p> <p>iv. FM 4880<br/>With pass criteria “Non-combustible core”</p> <p>AND</p> <p>v. ASTM D1929<br/>Shall have self ignition temperature of not less than 343°C.</p> | <p>vi. BS 8414 –1 Or 2<br/>With pass criteria as per BRE 135</p> <p>OR</p> <p>vii. NFPA 285<br/>With pass criteria “Pass”</p> <p>OR</p> <p>viii. FM 4881<br/>With pass criteria “Class 1”</p> <p>OR</p> <p>ix. ISO 13785-2<br/>With pass criteria “Pass”</p> |



**Table 1.17.b.: Sandwich Panel on Fire Resistance rated Exterior wall -Test Requirements**

| OCCUPANCY AND TYPE OF BUILDING  | TEST 1<br>SANDWICH PANEL AS PRODUCT   | TEST 2<br>SANDWICH PANEL IN WALL ASSEMBLY  |
|---|---|--|
| <p><b>1. ANY BUILDING WITH ANY HEIGHT AND ANY OCCUPANCY</b></p> <p><b>(SHALL BE TESTED FOR THE THICKNESS INTENDED TO BE USED)</b></p> | <p>i. Core shall be tested to the criteria iii or iv and v.</p> <p>ii. Panel shall be tested with the thickness intended to the criteria iii or iv and v.</p> <p>iii. EN 13501-1<br/>With pass criteria A OR A2-s1-d0</p> <p>OR</p> <p>iv. FM 4880<br/>With pass criteria "Non-combustible core"</p> <p>AND</p> <p>v. ASTM D1929<br/>Shall have self ignition temperature of not less than 343°C.</p> | <p>vi. ASTM E 119<br/>With pass criteria "1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.</p> <p>OR</p> <p>vii. UL 263<br/>With pass criteria "1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.</p> <p>OR</p> <p>viii. EN 1362-3<br/>With pass criteria "1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.</p> <p>OR</p> <p>ix. EN 1362-4<br/>With pass criteria "1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.</p> |



**Table 1.17.c.: Sandwich Panel in various applications -Test Requirements**

| APPLICATIONS   | TEST 1<br>SANDWICH PANEL AS<br>PRODUCT   | TEST 2<br>SANDWICH PANEL IN<br>WALL ASSEMBLY   |
|--|--|--|
| <p><b>1. INTERNAL NON FIRE RESISTANCE RATED WALLS AND PARTITIONS</b></p> <p><b>(SHALL BE TESTED FOR THE THICKNESS INTENDED TO BE USED)</b></p> | <p>i. EN 13501-1<br/>With pass criteria B-d0-S1</p> <p>OR</p> <p>i. ASTM E 84/ UL 723<br/>With pass criteria "Class A"</p> <p>OR</p> <p>i. BS 476 Part 7<br/>With pass criteria "Class 1"</p> <p>OR</p> <p>i. FM 4880<br/>With pass criteria "Non-combustible core"</p> <p>AND</p> <p>i. ASTM D1929<br/>Shall have self ignition temperature of not less than 343°C.</p> | <p>NOT REQUIRED</p>  |
| <p><b>2. INTERNAL FIRE RESISTANCE RATED WALLS AND PARTITIONS</b></p> <p><b>(SHALL BE TESTED FOR THE THICKNESS INTENDED TO BE USED)</b></p>     | <p>i. EN 13501-1<br/>With pass criteria B-d0-S1</p> <p>OR</p> <p>ii. FM 4880<br/>With pass criteria "Non-combustible core"</p> <p>AND</p> <p>iii. ASTM D1929<br/>Shall have self ignition temperature of not less than 343°C.</p>  | <p>iv. FM 4881<br/>With pass criteria "Class 1"</p> <p>OR</p> <p>v. UL 1715<br/>With pass criteria "1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.</p> <p>OR</p> <p>vi. UL 1040<br/>With pass criteria "1 Hr or 2 Hr OR 3 Hr as per required fire rating of the wall.</p> |



**Table 1.17.c.: Sandwich Panel in various applications -Test Requirements**

| APPLICATIONS  | TEST 1<br>SANDWICH PANEL AS<br>PRODUCT  | TEST 2<br>SANDWICH PANEL IN<br>WALL ASSEMBLY  |
|---|---|---|
| <p><b>3. COLD STORAGE WALLS</b><br/><br/>(SHALL BE TESTED FOR THE THICKNESS INTENDED TO BE USED)</p>            | <p>i. EN 13501-1<br/>With pass criteria B-d0-S1</p> <p>OR</p> <p>ii. FM 4880<br/>With pass criteria “Non-combustible core”</p> <p>AND</p> <p>iii. ASTM D1929<br/>Shall have self ignition temperature of not less than 343°C.</p> | <p>NOT REQUIRED</p>   |
| <p><b>4. ROOFING-SPRINKLERED BUILDINGS</b><br/><br/>(SHALL BE TESTED FOR THE THICKNESS INTENDED TO BE USED)</p> | <p>i. ASTM D1929<br/>Shall have self ignition temperature of not less than 343°C.</p>   | <p>ii. NFPA 256<br/>With pass criteria “Class B”</p> <p>OR</p> <p>iii. ASTM E 108<br/>With pass criteria “Class B”</p> <p>OR</p> <p>iv. EN 13501-5 +A1<br/>With pass criteria “Class Broof t4”.</p> <p>OR</p> <p>v. UL 790<br/>With pass criteria “Class B”</p> |



**Table 1.17.c.: Sandwich Panel in various applications -Test Requirements**

| APPLICATIONS   | TEST 1<br>SANDWICH PANEL AS<br>PRODUCT  | TEST 2<br>SANDWICH PANEL IN<br>WALL ASSEMBLY  |
|--|---|---|
| <p><b>5. ROOFING-NON SPRINKLERED BUILDINGS</b></p> <p><b>(SHALL BE TESTED FOR THE THICKNESS INTENDED TO BE USED)</b></p> | <p>i. ASTM D1929<br/>Shall have self ignition temperature of not less than 343°C.</p> | <p>ii. NFPA 276<br/>With pass criteria "Class 1"<br/>OR<br/>iii. ASTM E 108<br/>With pass criteria "Class A"<br/>OR<br/>iv. EN 13501-5 +A1<br/>With pass criteria "Class Broof t4".<br/>OR<br/>v. UL 790<br/>With pass criteria "Class A"<br/>OR<br/>vi. FM 4470 Or FM 4471<br/>With pass criteria "Pass"</p> |



## 4.10. GRC/GRFC and GRP Systems

- 4.10.1.** GRP/GRFC and GRP systems shall comply with general requirements of **Section 4.5**, where used on façade and exterior wall and the specific requirements of **Section 4.10**.
- 4.10.2.** GRP/GRFC and GRP systems may be used in a variety of building exterior envelope and Façade systems, many of which may be project based and of a specific design. However Manufacturers, Consultants, Design Teams, Contractors and Testing laboratories must ensure that these systems comply in the first instance with the Reaction to Fire, Surface Spread of Flame and Resistance to Fire performance requirements and intent of the UAE Fire and Life Safety Code of Practice. This also includes selection of non-combustible formers, appropriate Fire Stopping and buildability of the tested system against the field application.

### 4.10.3. Definition

- 4.10.3.1.** Glass fiber reinforced concrete or GFRC is a type of fiber-reinforced concrete. The product is also known as glass fiber reinforced concrete or GRC. Glass fiber concretes are mainly used in exterior building façade panels and as architectural pre-cast concrete.



GRC PANEL FOR ILLUSTRATION





**4.10.3.2.** Glass-reinforced plastic (GRP), also known as glass fibre reinforced plastic (GRFP) is a fibre reinforced polymer made of a plastic matrix reinforced with Glass Fibres.

#### **4.10.4. Specific Requirements**

**4.10.4.1.** GRP(GRFP) shall be constructed such that it meets the performance characteristics required as per ASTM D3841.

**4.10.4.2.** GRC/GRFC and GRP systems shall be certified and listed by a third party independent testing and Certification body, approved by Civil Defence.

**4.10.4.3.** GRC/GRFC and GRP systems shall be Marked/labeled to verify its certification mark from accredited certification laboratory.

**4.10.4.4.** The Base layers and core materials shall be tested separately and entire assembly including ornaments, trims and moldings' with intended thickness, joints, seams, fasteners and wall arrangement shall be tested in accordance with **Table 1.18.a**.

**4.10.4.5.** Where GRC/GRFC and GRP systems are installed on Fire rated or load bearing walls, the wall arrangement shall be tested in accordance with **Table 1.18.b**.

**4.10.4.6.** Reaction to Fire Testing of GRC/GRFS/GRP Products to EN13501-1 MUST include EN 13823 and EN ISO 11925 testing as a panel with the thickness and form of intended use, including consideration of air space behind the formed panel. Mounting on non-combustible substrates for the EN ISO 11925 test is not appropriate should the intended use not be reflected during reaction to fire testing.

#### **4.10.5. Test Certification**

**4.10.5.1.** GRC/GRFC and GRP panels and facade systems on non-fire resistance rated and non load bearing exterior wall coverings shall comply with **Table 1.18.a**.

**4.10.5.2.** GRC/GRFC and GRP panels and facade systems on fire resistance rated exterior wall assembly coverings shall comply with **Table 1.18b**.

#### **4.10.6. Application**

**4.10.6.1.** The occupancies and type of buildings that are allowed to have GRC/GRFC and GRP shall be in accordance with **Table 1.18.a**. and **Table 1.18.b**.



**Table 1.18.a.: GRC/ GRFC and GRP Panels on Non-Fire Resistance rated and Non-Load bearing Exterior wall coverings-Test Requirements**

| OCCUPANCY AND TYPE OF BUILDING   | TEST 1<br>GRC/ GRFC/ GRP AS PRODUCT   | TEST 2<br>GRC/ GRFC/ GRP AS WALL ASSEMBLY   |
|--|---|---|
| <p>1. SUPER HIGHRISE BUILDING</p> <p>2. HIGHRISE BUILDING</p> <p>3. MALLS</p> <p>4. THEME PARKS</p> <p>5. SCHOOLS</p> <p>6. HOSPITALS</p> <p>7. ASSEMBLY</p> | <p>i. EN 13501-1<br/>With pass criteria<br/>A OR A2-s1-d0</p> <p>WITH</p> <p>ii. EN 13823</p> <p>AND</p> <p>iii. EN ISO 11925</p> <p>AND</p> <p>iv. ASTM D1929<br/>Shall have self ignition<br/>temperature of not less<br/>than 343°C.</p> <p>OR</p> <p>v. ASTM D3841 for GRP only<br/>with category CC1</p> | <p>vi. BS 8414 –1 Or 2<br/>With pass criteria<br/>as per BRE 135</p> <p>OR</p> <p>vii. FM 4881<br/>With pass criteria<br/>“Pass”</p> <p>OR</p> <p>viii. ISO 13785-2<br/>With pass criteria<br/>“Pass”</p> |
| <p>8. LOWRISE BUILDING</p> <p>9. MIDRISE BUILDING</p> <p>10. WAREHOUSE</p> <p>11. INDUSTRIAL</p>   | <p>i. EN 13501-1<br/>With pass criteria<br/>B-s1-d0</p> <p>OR</p> <p>ii. ASTM D1929<br/>Shall have self ignition<br/>temperature of not less<br/>than 343°C.</p> <p>OR</p> <p>iii. ASTM D3841 for GRP only<br/>with category CC2</p>  | <p>iv. BS 8414 –1 Or 2<br/>With pass criteria<br/>as per BRE 135</p> <p>OR</p> <p>v. FM 4881<br/>With pass criteria<br/>“Pass”</p> <p>OR</p> <p>ix. ISO 13785-2<br/>With pass criteria<br/>“Pass”</p>     |



**Table 1.18.b.: GRC/ GRFC and GRP Panels on Fire Resistance rated and Non-Load bearing Exterior wall coverings-Test Requirements**

| OCCUPANCY AND TYPE OF BUILDING   | TEST 1<br>GRC/ GRFC/ GRP AS PRODUCT   | TEST 2<br>GRC/ GRFC/ GRP AS WALL ASSEMBLY  |
|--|---|--|
| <p>1. ANY BUILDING</p> <p>2. ANY INSTALLATION</p> <p>3. ANY AESTHETICS</p> | <p>i. EN 13501-1<br/>With pass criteria A OR A2-s1-d0</p> <p>WITH</p> <p>ii. EN 13823</p> <p>AND</p> <p>iii. EN ISO 11925</p> <p>AND</p> <p>iv. ASTM D1929<br/>Shall have self ignition temperature of not less than 343°C.</p> <p>OR</p> <p>v. ASTM D3841 for GRP only with category CC1</p> | <p>vi. ASTM E 119<br/>With pass criteria "1 Hr or 2 Hr or 3 Hr as per required fire ratings of the wall.</p> <p>OR</p> <p>vii. UL 263<br/>With pass criteria "1 Hr or 2 Hr or 3 Hr as per required fire ratings of the wall.</p> <p>OR</p> <p>viii. EN 1362-3<br/>With pass criteria "1 Hr or 2 Hr or 3 Hr as per required fire ratings of the wall.</p> <p>OR</p> <p>ix. EN 1362-4<br/>With pass criteria "1 Hr or 2 Hr or 3 Hr as per required fire ratings of the wall.</p> |



## 5. Glazing Systems

### 5.1. Intention

- 5.1.1.** The provisions of this document shall specify the minimum requirements for the certification and listing, design, installation, inspection and maintenance of glazing systems to achieve acceptable levels of Fire resistance, Reaction to fire, Perimeter fire protection, Safety of people from impact with glass.
- 5.1.2.** The weather protection of buildings is not within the scope or intention of this section. Weather protection aspect to buildings, such as protection from wind and water, seismic pressure etc., shall comply with Municipality regulations and requirements.
- 5.1.3.** The intention of this section is to ensure that flame spread on exterior glazed facade, or glazed room radiation or radiation from glazed fire doors is restricted to ensure safety of people.

### 5.2. Applications of Glazing Systems where glazing is specified as part of fire compartmentation

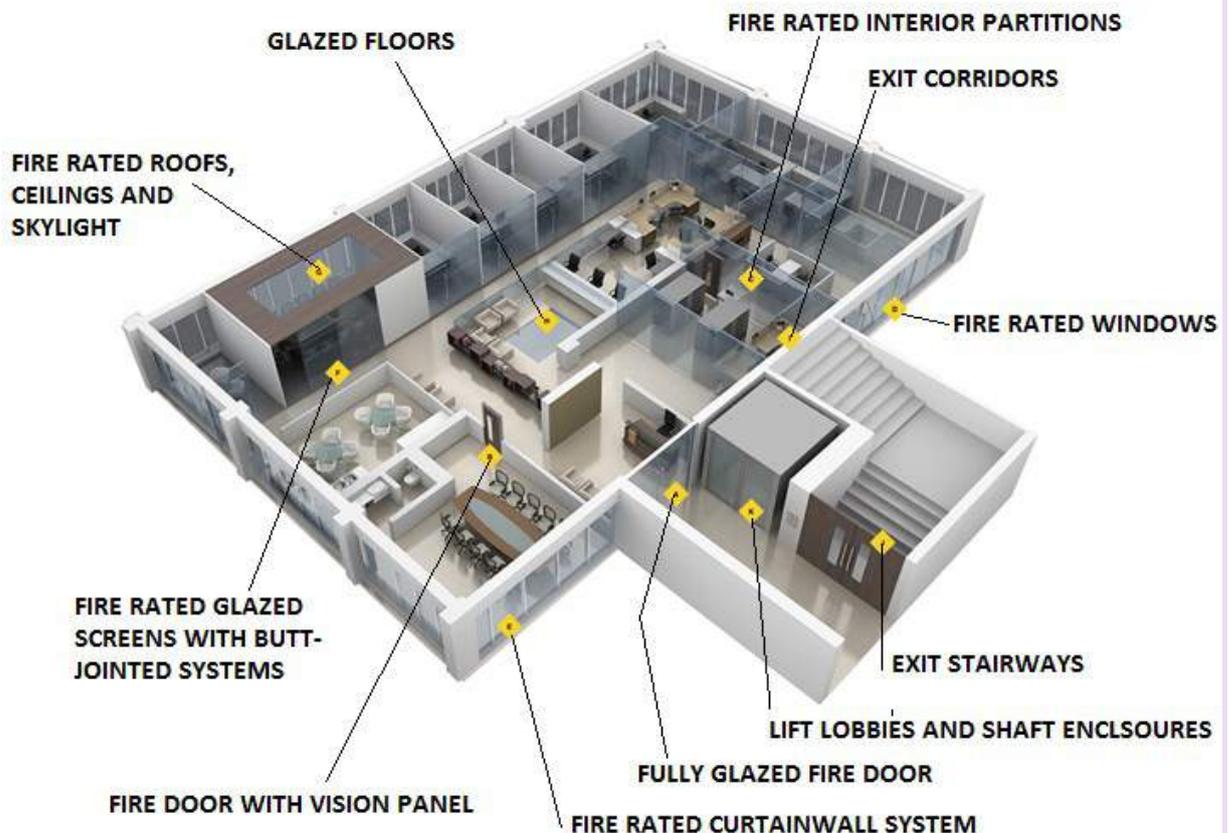


Figure 1.20.: Glazing Applications in a building



### 5.3. Glazing Testing and Acceptance

**5.3.1.** The requirement for fire rated glazing in any building shall be based on the Civil Defence approved Fire and Life Safety Drawings and strategy for the building, which identifies the following.

- a. The type of Fire resistance required according to EN standards or Fire resistance rating & Fire protection rating according to American standards.
- b. The duration of fire resistance required (30 min, 45 min, 60 min, 90 min, 120 min etc.)
- c. Whether the glazing should be 'integrity' only or 'integrity and insulation'.

**5.3.2.** The Glazing shall comply with the relevant general requirements of **Section 4.5.**,

**Table 1.18: Glazing Test requirements.**

| GLAZING APPLICATION IN THE BUILDING           | <u>TEST A</u><br>WHERE FIRE RESISTANCE RATING IS REQUIRED   | <u>TEST B</u><br>SAFETY GLAZING TESTS<br>(Resistance to impact either without breaking, or breaking in way such that persons may not sustain piercing or cutting injuries.)                                 |
|---|---|---|
| 1. NON LOAD BEARING CURTAINWALL WITH GLAZING, | <u>TESTED WITH ANY OF THE FOLLOWING, WHERE FIRE RESISTANCE RATING IS REQUIRED</u><br><br>Pass as assembly with NFPA 251<br>Pass as assembly with EN 1364-3<br>Pass as assembly with UL 263<br>Pass as assembly with ASTM E119 | EN 12600<br>OR<br><u>ANY OF THE FOLLOWING</u><br><br>ANSI Z97.1, A FOR < 0.9 m <sup>2</sup> ,<br>B FOR > 0.9 m <sup>2</sup><br>CPSC 16 CR 1202, I FOR < 0.9 m <sup>2</sup> ,<br>II FOR > 0.9 m <sup>2</sup> |
| 2. NON LOAD BEARING WALLS                     | <u>TESTED WITH ANY OF THE FOLLOWING, WHERE FIRE RESISTANCE RATING IS REQUIRED</u><br><br>Pass as assembly with EN 1364-1<br>Pass as assembly with NFPA 251<br>Pass as assembly with UL 263<br>Pass as assembly with ASTM E119 | EN 12600<br>OR<br><u>ANY OF THE FOLLOWING</u><br><br>ANSI Z97.1, A FOR < 0.9 m <sup>2</sup> ,<br>B FOR > 0.9 m <sup>2</sup><br>CPSC 16 CR 1202, I FOR < 0.9 m <sup>2</sup> ,<br>II FOR > 0.9 m <sup>2</sup> |
| 3. CEILING                                    | <u>TESTED WITH ANY OF THE FOLLOWING, WHERE FIRE RESISTANCE RATING IS REQUIRED</u><br><br>Pass as assembly with EN 1364-2<br>Pass as assembly with NFPA 251<br>Pass as assembly with UL 263<br>Pass as assembly with ASTM E119 | EN 12600<br>OR<br><u>ANY OF THE FOLLOWING</u><br><br>ANSI Z97.1, A FOR < 0.9 m <sup>2</sup> ,<br>B FOR > 0.9 m <sup>2</sup><br>CPSC 16 CR 1202, I FOR < 0.9 m <sup>2</sup> ,<br>II FOR > 0.9 m <sup>2</sup> |
| 4. LOAD BEARING ELEMENTS (FLOOR AND ROOF)     | <u>TESTED WITH ANY OF THE FOLLOWING, WHERE FIRE RESISTANCE RATING IS REQUIRED</u><br><br>Pass as assembly with EN 1365-2<br>Pass as assembly with NFPA 251<br>Pass as assembly with UL 263<br>Pass as assembly with ASTM E119 | EN 12600<br>OR<br><u>ANY OF THE FOLLOWING</u><br><br>ANSI Z97.1, A FOR < 0.9 m <sup>2</sup> ,<br>B FOR > 0.9 m <sup>2</sup><br>CPSC 16 CR 1202, I FOR < 0.9 m <sup>2</sup> ,<br>II FOR > 0.9 m <sup>2</sup> |



**Table 1.18: Glazing Test requirements.**

| GLAZING APPLICATION IN THE BUILDING                                 | <u>TEST A</u>  | <u>TEST B</u><br>SAFETY GLAZING TESTS<br>(Resistance to impact either without breaking, or breaking in way such that persons may not sustain piercing or cutting injuries.)                             |
|---|--|---|
| 5. DOORS AND VISION PANELS  | <u>TESTED WITH ANY OF THE FOLLOWING, WHERE FIRE RESISTANCE RATING IS REQUIRED</u><br><br>Pass as assembly with UL 10 C<br>Pass as assembly with NFPA 252<br>Pass as assembly with EN 1634-1<br>Pass as assembly with BS 476 Part 22. | EN 12600<br>OR<br><u>ANY OF THE FOLLOWING</u><br><br>ANSI Z97.1, A FOR $< 0.9 \text{ m}^2$ ,<br>B FOR $> 0.9 \text{ m}^2$<br>CPSC 16 CR 1202, I FOR $< 0.9 \text{ m}^2$ ,<br>II FOR $> 0.9 \text{ m}^2$ |
| 6. WINDOWS  | <u>TESTED WITH ANY OF THE FOLLOWING, WHERE FIRE RESISTANCE RATING IS REQUIRED</u><br><br>Pass as assembly with UL 9<br>Pass as assembly with NFPA 257<br>Pass as assembly with EN 1634-1:2014  | EN 12600<br>OR<br><u>ANY OF THE FOLLOWING</u><br><br>ANSI Z97.1, A FOR $< 0.9 \text{ m}^2$ ,<br>B FOR $> 0.9 \text{ m}^2$<br>CPSC 16 CR 1202, I FOR $< 0.9 \text{ m}^2$ ,<br>II FOR $> 0.9 \text{ m}^2$ |
| 7. BATHING/SHOWER ENCLOSURE/SCREEN/ SWIMMING/ WET AREAS (SLIP RISK) | No Requirements  | EN 14428<br>AND<br>Also shall comply with safety glass requirements of Section 5.4.2.   |



## 5.4. Design, Installation, Inspection & Maintenance

### 5.4.1. Fire Resistant Glazing - Design / Specification

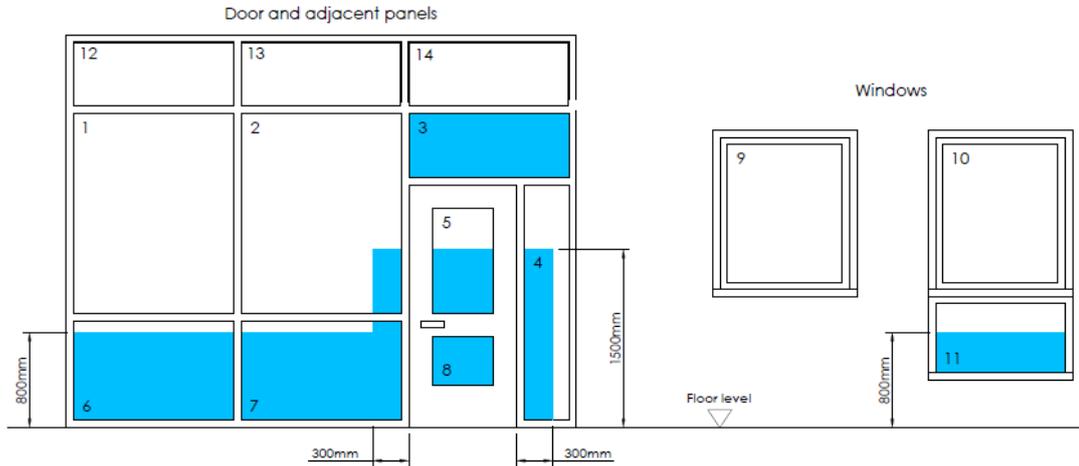
- 5.4.1.1.** Fire resistant glazing systems shall be designed by a specialist manufacturer.
- 5.4.1.2.** It is the consultant's responsibility to ensure that qualified glazing specialist is involved in the design, in full compliance with this code.
- 5.4.1.3.** In addition to the fire strategy Approved by Civil Defence, the following points shall be addressed by the glazing installer to ensure they are consistent with the fire strategy and overall intent of the proposed glazing system:
- a. The minimum fire rating specified relates to a full system of components. All elements of the fire barrier being created must collectively provide the performance required as part of a fire resistant assembly.
  - b. The final glazing system installed must be the same as the system that has been tested in accordance with the Civil Defence requirements. Project-specific differences should be discussed with the manufacturer and system certifier.
  - c. The system selected must be capable of performing in the environment in which it is intended to be installed, in particular internal or external environments.
  - d. The impact-resistance of the glazing has to be met as specified by the impact rating as per **Table 1.18**.
  - e. For unidirectional systems, the direction of the fire-side should be labeled and easily identifiable on the glass, profiles or accessories. Where the direction of fire is not known, only bi-directional fire-rated glazing components should be used.
  - f. Fire-rated glazing in inclined and horizontal applications shall be tested and approved separately to fire rated glazing in vertical applications. Vertically tested systems cannot be assumed to work in horizontal or inclined glazing applications.
  - g. The specified system should have a label with scope based on the type of fire represented during the fire test of the system (For example, a fire resistant system tested for domestic fires may not sustain conditions of industrial fires).
  - h. Considerations for the glazing system design shall include but not be limited to the overall screen size, fenestration layout within the screen, materials used in construction of the profile (such as the gauge, quality, thickness, finish, etc.) and the amount of edge cover and edge clearance.
  - i. Standard impact safety toughened or safety / security laminated glass is not necessarily fire-rated and the same cannot be used without it being tested and approved.



### 5.4.2. Safety Glazing - Design / Specification

**5.4.2.1.** The Safety Glazing is required in critical locations (2,3,4,5,6,7,8 and 11) described in doors, side panels and low level glazing as shown in the **Figure 1.21 and 1.22.**

Critical locations in terms of safety.



**Figure 1.21.: Safety Glazing at Door and adjacent areas**

**Figure 1.22.: Safety Glazing at Windows**

**5.4.2.2.** Minimum classification Requirements of safety glass or safety plastics to be used in critical locations (Such as Gymnasiums, places of energetic activities, play areas etc.,) shall be as per **Table 1.19.**

**5.4.2.3.** Where glazing is only accessible from one side (3.a, 4.a), the testing and classification can be from only that side.

**Table 1.19: Minimum Classification for Safety Glazing requirements.**

| CRITICAL LOCATION                  | GLAZING PANE DIMENSION          | SAFETY GLASS | SAFETY PLASTICS |
|------------------------------------|---------------------------------|--------------|-----------------|
| 1. DOORS                           | > 900 mm                        | 2(β)Φ        | Class B         |
|                                    | ≤ 900 mm                        | 3(β)Φ        | Class C         |
| 2. DOOR SIDE PANEL                 | > 900 mm                        | 2(β)Φ        | Class B         |
|                                    | ≤ 900 mm                        | 3(β)Φ        | Class C         |
| 3. FULLY BACKED MIRROR GLAZING (A) | > 900 mm                        | 2(β)Φ        | Class B         |
|                                    | ≤ 900 mm                        | 3(β)Φ        | Class C         |
| 4. UNBACKED MIRROR GLAZING (A)     | > 900 mm                        | 2(β)Φ        | Class Bo        |
|                                    | ≤ 900 mm                        | 3(β)Φ        | Class Co        |
| 5. LOW LEVEL AREAS                 | Irrespective of pane dimensions | 3(β)Φ        | Class C         |
| 6. BATHING AREAS                   | Irrespective of pane dimensions | 3(β)Φ        | Class C         |
| 7. AREAS OF SPECIAL RISK           | Irrespective of pane dimensions | 3(β)Φ        | Class C         |



**5.4.2.4.** Glass Safety classification as per EN 12600 shall be as per **Table 1.20.** and **Table 1.21.**

**Table 1.20: Glass Classification as per EN 12600.**

| PVB LAMINATED GLASS CODE | PVB FILM THICKNESS | GLASS THICKNESS | CLASS AS PER EN 12600 |
|--------------------------|--------------------|-----------------|-----------------------|
| 33.1                     | 0.38 mm            | 6.4 mm          | 2(B)2                 |
| 44.1                     | 0.38 mm            | 8.4 mm          | 2(B)2                 |
| 55.1                     | 0.38 mm            | 10.4 mm         | 1(B)1                 |
| 33.2                     | 0.76 mm            | 6.8 mm          | 1(B)1                 |
| 44.2                     | 0.76 mm            | 8.8 mm          | 1(B)1                 |
| 44.4                     | 1.52 mm            | 9.5 mm          | 1(B)1                 |
| 44.6                     | 2.28 mm            | 10.3 mm         | 1(B)1                 |
| 55.2                     | 0.76 mm            | 10.8 mm         | 1(B)1                 |
| 66.2                     | 0.76 mm            | 12.8 mm         | 1(B)1                 |
| 88.2                     | 0.76 mm            | 16.8 mm         | 1(B)1                 |

**Table 1.21: Tempered Glass Classification as per EN 12600.**

| THICKNESS OF TEMPERED GLASS | MINIMUM REQUIRED CLASSIFICATION AS PER EN 12600 |
|-----------------------------|---|
| 4 mm                        | 1(C)2   |
| 6 mm                        | 1(C)2   |
| 8 mm                        | 1(C)2   |
| 10 mm                       | 1(C)1   |
| 12 mm                       | 1(C)1   |

**5.4.3. Labeling / Manifestation**

- 5.4.3.1.** Under some conditions of lighting, large areas of transparent glazing used to subdivide a building might not be readily apparent. The risk of human impact with this glazing is greatest if adjacent areas within or immediately outside the building are at the same level so that a person might reasonably assume unimpeded passage from one part to another.
- 5.4.3.2.** If the presence of such glazing is not sufficiently well indicated by mullions, transoms, door frames, large door handles, stall risers or other components of the glazing system, it shall be made apparent by some form of manifestation.



**5.4.3.3.** The manifestation employed should be of a sufficient size to make it immediately obvious.

**5.4.3.4.** It shall take the form of broken or solid lines, patterns or company logos or similar, positioned between 600 mm and 1500 mm above floor level at appropriate horizontal intervals. The manifestation should preferably be permanent, e.g. etching of the glazing, but alternatively, if applied materials are used they should be durable and not easily removed.

#### **5.4.4. Overhead glazing**

**5.4.4.1.** Glass used in overhead glazing shall be required to remain in position post-breakage.

**5.4.4.2.** Overhead glazing shall be laminated and include a post-breakage containment system, such that if the glass breaks the glass is held in place until it can be replaced.

**5.4.4.3.** Broken glass shall be replaced promptly.

**5.4.4.4.** Examples of post-breakage containment systems are:

- a.** Silicone structural adhesives
- b.** Mechanically fixed batten bars
- c.** Adhesively fixed batten bars
- d.** Polyester and acrylic foam tapes
- e.** Structural washers
- f.** Adhesive-backed polymeric film applied to glass in conjunction with one of the retention systems listed above.

**5.4.4.5.** Injury from objects falling through the glass are not considered in these requirements. A specific risk assessment should be conducted to evaluate this. However, consideration at design stage may enable selection of suitable glazing materials / measures to mitigate this situation.

**5.4.4.6.** This section does not consider the risk of injury to persons who may fall onto the non-vertical (sloping) overhead glazing.

**5.4.4.7.** CWCT TN66 shall be used to evaluate the safety and fragility of glazed roofing.



#### 5.4.5. Glass Floors and Staircases

- 5.4.5.1. The use of glass in floors or staircases shall be limited to pedestrian foot traffic only. (see GGF data sheet 7.3: Guidelines for the use of glass in floors and stairs)
- 5.4.5.2. For the specification of the design floor loads for the specific use of the building the following standard shall be used.
  - a. EN 1991-1-1: 2002: Eurocode 1 –Actions on structures –General actions –densities, self-weight, imposed loads for buildings.
  - b. Glass required to be walkable shall be designed in accordance with CWCT TN66 using the following standard in relation to the danger of slippage and minimum coefficients of friction. Slip resistance shall not depend on the use of specialized footwear.
  - c. BS 5395-1: 2010 Stairs. Code of practice for the design of stairs with straight flights and winders.
- 5.4.5.3. The strength of the supports shall be calculated by a competent structural engineer, with the deflection of the frame limited to an appropriate value for the glass type.
- 5.4.5.4. Consideration shall be given to the complete design process. The following list comprises a number of topics that shall be considered alongside the regulatory requirements. The list is not exhaustive but relates to the common considerations:
  - a. Imposed loadings from design code
  - b. Surface finish
  - c. Strength of supporting glazing system
  - d. Impact by falling or thrown objects
  - e. Exposure to solar radiation and water
  - f. Post-fracture behavior
  - g. Deflection
- 5.4.5.5. A risk analysis shall be based on the following:
  - a. Frequency of use
  - b. Potential for exposure to water and slipping
  - c. Potential for glazing breakage from impacts
  - d. Consequences of glazing failure, i.e. Post-breakage behavior of the glazing material.
- 5.4.5.6. The ability of a broken pane to remain in situ is dependent upon the loads being applied, the glass type, the temperature, the number of fractured plies and the type of interlayer considered in the construction.



#### 5.4.6. Installation

- 5.4.6.1.** The installation shall be carried out by an Civil Defence and Municipality approved installer or fabricator as per system manufacturer's installation instructions and shall comply with local regulations and the construction documents.

#### 5.4.7. Installer Qualification

- 5.4.7.1.** Installer and fabricator specializing in Glazing system installation and certified by the system manufacturer shall be listed with Municipality and Civil Defence Authority.
- 5.4.7.2.** The installer and fabricator license shall be based on the training and certification by the system manufacturer to install manufacturer's products as per specified listed system requirements.

#### 5.4.8. Inspection

- 5.4.8.1.** Special inspection shall be required for all Glazing system. Inspection shall take place in successive stages as installation progresses.
- 5.4.8.2.** The manufacturer's guidelines shall be available to and used by the glazing specialist.
- 5.4.8.3.** It is consultant's responsibility to recruit qualified glazing specialists to inspect the glazing systems or to hire the services of Civil Defence approved house of expertise.
- 5.4.8.4.** It is consultant's responsibility to ensure that installer's work is inspected during construction and installation at each stage.
- 5.4.8.5.** Consultant or Civil Defence approved house of expertise undertaking glazing inspections shall have the following qualifications.
- a.** Accredited to ISO/IEC 17020 or relevant IAS criteria or ICC specialist training and certification or equivalent international criteria acceptable to Municipality and Civil Defence.
  - b.** 2 glazing specialists, qualified as per **Section 5.4.9.**
  - c.** 3 years experience in fire and life safety aspect of glazing systems' inspections.



#### 5.4.9. Glazing Specialist Qualification

**5.4.9.1.** The glazing specialists of consultant's in-house team or Manufacturer's representative or Civil Defence approved house of expertise, undertaking design, consultancy, inspection shall have the following qualifications.

- a. Bachelor's degree in engineering
- b. 5 years experience in glazing systems design and inspections
- c. Training and certifications by the glazing system manufacturers.

**5.4.9.2.** The glazing specialists from consultants or manufacturers or house of expertise shall be registered and licensed by Civil Defence based on their qualifications as required by **Section 5.4.9.1.** and written examination.

#### 5.4.10. Civil Defence Acceptance of the installation

**5.4.10.1.** The main consultant and his hired façade consultant or house of expertise shall be responsible for the glazing design specifications, material selection, fabricator selection, initiation of laboratory tests, verification of test results, progressive inspection during construction and commissioning.

**5.4.10.2.** The main consultant, the Glazing system manufacturer, glazing system installer, glazing system fabricator, glazing specialist and the house of expertise shall jointly sign off the installation and provide final inspection report for Civil Defence' acceptance as evidence of compliance.

#### 5.4.11. Civil Defence registration of the glazing

**5.4.11.1.** The glazing processor shall be responsible for glazing tests as required by **Table 1.18., TEST B., Safety and impact tests.** The glazing processor shall be registered with Civil Defence along with his tested materials.

**5.4.11.2.** The glazing fabricator shall be responsible for glazing tests as required by **Table 1.18., TEST A., Fire rating of the glazing assembly.** The glazing fabricator shall be registered with Civil Defence along with his tested assemblies.



## 6. Roofing Systems

### 6.1. Intention

- 6.1.1. The provisions of this document shall specify the minimum requirements for the certification and listing, design, installation, inspection and maintenance of Roofing System to achieve acceptable levels of Fire safety of buildings.
- 6.1.2. The weather protection of buildings is not the scope or intention of this section. Weather protection aspect to buildings, such as protection from wind, water, seismic impact etc., shall comply with Municipality regulations and requirements.
- 6.1.3. The intention of this section is to ensure that flame spread on roofing is restricted.

### 6.2. Components of Roofing Systems

- 6.2.1. Roofing systems are composed of varying types of components such as Roof coverings, Organic or Glass Fiber, Asphalt felts, Metal Composite panels, Sandwich Panels, Photovoltaic Panels, Single Ply Membrane, Insulation, Support System etc.

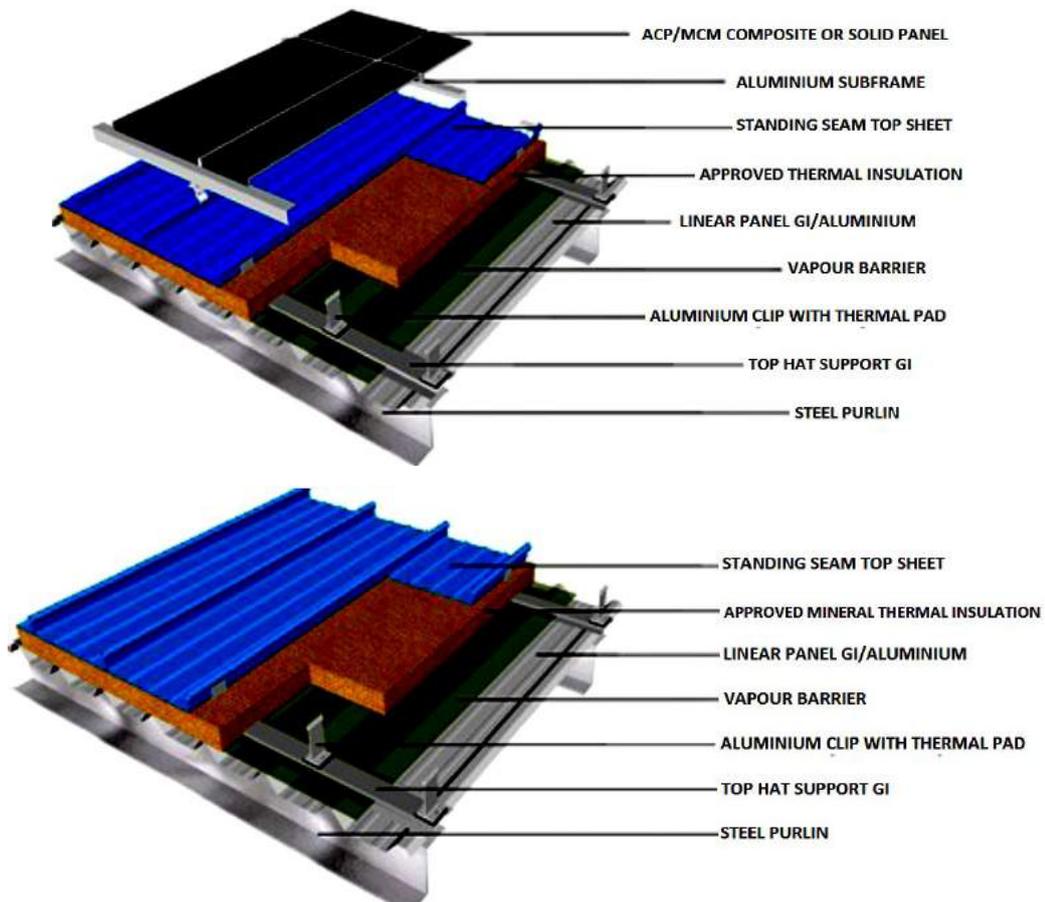


Figure 1.23.: Various components of Roofing System



### 6.3. Roofing System Testing and Acceptance

- 6.3.1. The roofing systems manufacturers/suppliers and their product systems shall be registered with Municipality and Civil Defense Authority.
- 6.3.2. The performance requirements of roofing systems shall be classified based on the following criteria.
  - a. Occupancy of the building.
  - b. Sprinkler protection for the building.
  - c. Distance and proximity to other buildings.
  - d. Construction Type and Building materials used.
- 6.3.3. The roofing systems shall be certified and listed by a third party independent Testing and Certification body, approved by Civil Defense.
- 6.3.4. Parties seeking approval for roof assemblies or rooftop structures shall furnish the test certificates, approval certification numbers for the system as an assembly and not for the individual components.
- 6.3.5. Only companies with a valid commercial license will be eligible for Civil Defence approval if products are tested and certified according to specifications and requirements of this code.
- 6.3.6. The entire roofing system including ornaments, trims and moldings' with intended thickness, involved core, insulation, joints, seams, fasteners and wall arrangement shall be tested in accordance with any of the following standards:
- 6.3.7. Only Private Villas, Commercial Villas and Agricultural buildings are exempted from having fire rated/ listed roof assemblies or rooftop structures.
- 6.3.8. Roof coverings with following materials shall be allowed without testing and certification.
  - a. Brick, masonry or concrete exposed roof deck
  - b. Tiles/ Slates made up of concrete or clay
  - c. Copper or ferrous sheets/shingles

### 6.4. Design, Installation, Inspection & Maintenance

- 6.4.1. **Design/Specification/Submittals**
  - 6.4.1.1. It is consultant's responsibility to recruit roofing specialists to design roofing systems in full compliance with this code.
  - 6.4.1.2. Consultant's roofing submittal to Civil Defence shall be during project design NOC application, along with architecture, fire alarm, fire fighting and smoke control proposals..
  - 6.4.1.3. Roofing System shall be specified in accordance with their test certifications as an assembly as per **Table 1.22**.



**Table 1.22.: Roofing System Test requirements.**

| OCCUPANCY AND TYPE OF BUILDING  | EXTERIOR FIRE EXPOSURE TO ROOFING ASSEMBLIES   | INTERIOR OR UNDER DECK FIRE EXPOSURE TO ROOFING ASSEMBLIES  | PLASTIC SKY LIGHTS ON ROOFING ASSEMBLIES  |
|---|--|---|---|
| 1. NON SPRINKLERED BUILDINGS,<br>2. BUILDINGS WITHOUT FIRE SUPPRESSION SYSTEMS,<br>3. BUILDINGS, LESS THAN 6 M FROM NEIGHBORING BUILDING,<br>4. MALLS,<br>5. ASSEMBLY,<br>6. HOSPITAL,<br>7. EDUCATIONAL, | <u>ANY OF THE FOLLOWING</u><br>Class A with ASTM E 108<br>Class AA with BS 476 -3<br>Class Broof t4 with EN 13501-5: +A1<br>Class A with UL 790<br>Class 1 with NFPA 276<br>Pass with FM 4470 or FM 4471 | <u>ANY OF THE FOLLOWING</u><br>CLASS I rating with FM 4450<br>Pass as assembly with UL 1256<br><br>Structural Metal panel Roof systems shall be tested with FM 4471<br><br>Roof systems with modified bitumen and other types of membrane roof systems shall be tested with FM 4470 | <u>ANY OF THE FOLLOWING</u><br>Class A with FM 4431<br>Class A with ASTM E 84<br>Class A with UL 723<br>Class 1 with BS 476 –7<br>Class A with EN 13501-1 |
| 8. OTHER BUILDINGS AND OCCUPANCIES, NOT MENTIONED ABOVE<br>9. BUILDINGS WITH SPRINKLER PROTECTION<br>10. BUILDINGS WITH FIRE SUPPRESSION SYSTEMS  | <u>ANY OF THE FOLLOWING</u><br>Class B with NFPA 256<br>Class B with ASTM E 108<br>Class BB with BS 476 -3<br>Class Broof t4 with EN 13501-5: +A1<br>Class B with UL 790                                 |   | <u>ANY OF THE FOLLOWING</u><br>Class B with FM 4431<br>Class B with ASTM E 84<br>Class B with UL 723<br>Class 2 with BS 476 –7<br>Class B with EN 13501-1 |

**6.4.1.4.** For Roof recovering situations, where covering an existing roofing system with a new roofing system or Roof Replacement situations where removing an existing roof system and replacing it with a new system, the following methods shall apply.

- a. Certified insulated systems may be installed over existing certified insulated systems when:
  - i. The new system is certified for use with the existing roof insulation type (glass fiber, perlite, wood fiber, foamed plastic, etc.
  - ii. The total thickness of insulation in both systems does not exceed the maximum specified for the new system being applied.
- b. For installation over noncombustible decks, any certified insulated system utilizing minimum 1-in.-thick insulation (glass fiber, polyisocyanurate or perlite) may be used over any existing insulated system regardless of the type, provided the insulation in both systems does not exceed the maximum specified for the new system being applied.



- c. The above classifications apply only to coverings composed of certified materials assembled as described in the individual manufacturer certifications; flashings and trimmings being the same as or not less than the equivalent of the roofing systems in each class, or of 16 oz. or heavier copper, No. 26 gauge or heavier galvanized steel, or 0.019 in. thick or heavier aluminum.

**6.4.1.5.** Roofing shall be designed by a roofing specialist designer and shall specify in accordance with their test certifications, as an assembly as per **Table 1.22.** and manufacturer's recommendations.

**6.4.1.6.** The system manufacturer shall provide a formal submittal to the Municipality and Civil Defence for product registration, that will consist of the following.

- a. Product Data – Manufacturer's Specifications, Technical Data and Material Safety Data Sheet for each material including the composition and limitations, if any.
- b. Design Listings and certifications – System design listing or test certifications, including illustrations, from an accredited testing laboratory as per referenced standards that is applicable to each system configuration. Test reports without certification from accredited certification bodies is invalid.
- c. Engineering Judgment (EJ) – Where there is deviation from a listed and certified system, on site, for a particular configuration, the manufacturer, specialist designer, roofing contractor and consultant shall jointly provide a site specific EJ.
- d. Method Statement shall clearly define the manufacturer's installation instructions.
- e. Statement of Manufacturer's standard warranty for minimum of 10 years.
- f. An undertaking letter in understanding with Civil Defence, that supplying any material that is non compliant with this code is illegal and punishable.

#### **6.4.2. Installation**

**6.4.2.1.** The installation shall be carried out by Civil Defence and Municipality approved installer as per system manufacturer's installation instructions and shall comply with local regulations and the construction documents.

#### **6.4.3. Installer Qualification**

**6.4.3.1.** Installer specializing in Roofing system installation and certified by the system manufacturer shall be listed with Municipality and Civil Defence Authority.

**6.4.3.2.** The installer license shall be based on the training and certification by the system manufacturer to install manufacturer's products as per specified listed system requirements.

#### **6.4.4. Inspection**

**6.4.4.1.** The manufacturer's guidelines shall be available to and used by the inspection personnel.

**6.4.4.2.** The consultant shall be responsible for progressive inspection and shall sign off the inspection report.



#### 6.4.5. Civil Defence Acceptance

- 6.4.5.1.** The main consultant, the roofing system manufacturer, roofing system installer shall jointly sign off the installation and provide final inspection report for Civil Defence' acceptance as evidence of compliance.



## 7. Construction Material Test Standards, Approval and registration.

### 7.1. Acceptable Test Standards and criteria

**7.1.1.** All the Materials, Components, Systems, Assemblies, equipment, Products and Accessories, referred to in this chapter with respect to construction and Life Safety, Fire Safety and Emergency Services shall be Listed, Approved and Registered by the Civil Defence Material Approval Department.

**7.1.2.** **There is no year of edition mentioned against any test standards. It is the intent of Civil Defence to convey to the customers seeking material tests and the test laboratories to follow the “LATEST EDITION OF THE TEST STANDARD, AS AND WHEN THEY ARE UPGRADED/REVISED/AMENDED, TO THE DATE.”**

### 7.1.3. Fire resistance rating of Fire Walls/ Fire Barriers

- i. EN 1365-1: fire resistance tests for loadbearing elements. part 1: walls.
- ii. ASTM E 119, Standard Test Methods for Fire Tests of Building Construction and Materials
- iii. EN 1364-3, Fire resistance tests for non-loadbearing elements. Curtain walling. Full configuration (complete assembly)
- iv. EN 1364-4: Fire resistance tests for non-loadbearing elements - Part 4: Curtain walling - Part configuration
- v. EN 1364-1, Fire resistance tests for non-loadbearing elements - Part 1: Walls;
- vi. UL 263, Standard for Fire Tests of Building Construction and Materials.
- vii. NFPA 251, Standard methods of tests of fire resistance of building construction and materials.
- viii. BS 476-21: Fire tests on building materials and structures - part 21: Methods for the determination of the fire resistance of loadbearing elements of construction
- ix. BS 476-22: Fire tests on building materials and structures - part 22: Methods for the determination of the fire resistance of non-loadbearing elements of construction
- x. EN 1365-2 Fire classification of construction products and building elements. Classification using data from fire resistance tests, excluding ventilation services
- x. UL 1709, Construction elements with or without load: Beams, pillars, slabs, sealings, lockgates, ducts, walls, curtain walls, etc.
- xi. LPS 1208, LPCB fire resistance requirements for elements of construction used to provide Compartmentation.



#### 7.1.4. Interior Wall and Ceiling Finish materials and ceiling plenum assembly

- i. ASTM E 119, Standard Test Methods for Fire Tests of Building Construction and Materials
- ii. UL 723, Standard for Test of Surface Burning Characteristics of Building Materials
- iii. FM 4880, Approval Standard for Class 1 Insulated Wall or Wall and Roof/ Ceiling Panels; Plastic Interior Finish Materials; Plastic Exterior Building Panels; Wall/Ceiling Coating Systems; Interior or Exterior Finish Systems.
- iv. NFPA 286, Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.
- v. EN 13823: Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item.
- vi. EN-ISO 11925-2: Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test.
- vii. EN-ISO 1182: Reaction to fire tests for products - Non-combustibility test
- viii. EN-ISO 1716: Reaction to fire tests for products - Determination of the gross heat of combustion (calorific value)
- ix. EN 13501-1: Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.
- x. BS 476 Part 7: Fire Tests on Building materials and structures; method of test to determine the classification of the surface spread of flame of products
- xi. BS 476 Part 6: Fire Tests on Building materials and structures; method of test for fire propagation for products
- xii. EN 1364-2, Fire resistance tests for non-loadbearing elements. Ceilings.
- xiii. UL 1715, Standard for Fire Test of Interior Finish Material.

#### 7.1.5. Expanded Vinyl Wall coverings

- i. ASTM E 84, Standard Test Method of Surface Burning Characteristics of Building Materials
- ii. UL 723, Standard for Test of Surface Burning Characteristics of Building Materials
- iii. NFPA 265., Standard methods of fire tests for evaluating room fire growth contribution of textile or expanded vinyl wall coverings on full height panels and walls.
- iv. EN 13823: Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item.
- v. EN-ISO 11925-2: Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test.
- vi. EN-ISO 1182: Reaction to fire tests for products - Non-combustibility test
- vii. EN-ISO 1716: Reaction to fire tests for products - Determination of the gross heat of combustion (calorific value)
- viii. EN 13501-1: Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.
- ix. BS 476 Part 7: Fire Tests on Building materials and structures; method of test to determine the classification of the surface spread of flame of products
- x. BS 476 Part 6: Fire Tests on Building materials and structures; method of test for fire propagation for products
- xi. EN 14390 Fire test - Large-scale room reference test for surface products



### 7.1.6. Interior Wall and Ceiling Coverings

- i. NFPA 286, Standard methods of fire tests for evaluating contribution of wall and ceiling interior finish to room fire growth
- ii. ASTM E 84, Standard Test Method of Surface Burning Characteristics of Building Materials
- iii. UL 723, Standard for Test of Surface Burning Characteristics of Building Materials.
- iv. EN 1364-2: Fire resistance tests for non loadbearing elements. Ceilings.
- v. EN 13823: Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item.
- vi. EN-ISO 11925-2: Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test.
- vii. EN-ISO 1182: Reaction to fire tests for products - Non-combustibility test
- viii. EN-ISO 1716: Reaction to fire tests for products - Determination of the gross heat of combustion (calorific value)
- ix. EN 13501-1: Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.
- ix. BS 476 Part 7: Fire Tests on Building materials and structures; method of test to determine the classification of the surface spread of flame of products
- x. BS 476 Part 6: Fire Tests on Building materials and structures; method of test for fire propagation for products

### 7.1.7. Interior Floor and Floor Coverings

- i. CPSC 16 CFR, Part 1630
- ii. NFPA 253, standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
- iii. ASTM E 648, Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
- iv. EN 13501-1: Fire Classification of Construction products and building elements; classification using data from reaction to fire tests
- v. EN ISO 9239-1 Reaction to fire tests for floorings -- Part 1: Determination of the burning behavior using a radiant heat source.
- vi. DIN 4102-14 - Fire behavior of building materials and elements - Part 14: Determination of the burning behavior of floor covering systems using a radiant heat source
- vii. ULC - S102.2, Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.

### 7.1.8. Combustible Decorative Materials

- i. NFPA 701, Fire test to textiles and films.
- ii. CAN/ULC-S109 Flame tests of flame-resistant fabrics and films
- iii. EN 13823: Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item.
- iv. EN-ISO 11925-2: Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test.
- v. EN-ISO 1182: Reaction to fire tests for products - Non-combustibility test
- vi. EN-ISO 1716: Reaction to fire tests for products - Determination of the gross heat of combustion (calorific value)
- x. BS 476 Part 6: Fire Tests on Building materials and structures; method of test for fire propagation for products



- vii. EN 13501-1: Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.
- xiii. BS 476 Part 7: Fire Tests on Building materials and structures; method of test to determine the classification of the surface spread of flame of products

#### 7.1.9. Textile Wall and Textile Ceiling Materials

- i. ASTM E 84, Standard Test Method of Surface Burning Characteristics of Building Materials
- ii. UL 723, Standard for Test of Surface Burning Characteristics of Building Materials.
- iii. BS 476 Part 7: Fire Tests on Building materials and structures; method of test to determine the classification of the surface spread of flame of products
- iv. BS 476 Part 6: Fire Tests on Building materials and structures; method of test for fire propagation for products
- v. EN 13501-1 Fire classification of construction products and building elements. Classification using test data from reaction to fire tests

#### 7.1.10. Carpets and Textile floor finish

- i. ASTM D 2859, Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.
- ii. EN 13823: Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item.
- iii. EN-ISO 11925-2: Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test.
- iv. EN-ISO 1182: Reaction to fire tests for products - Non-combustibility test
- v. EN-ISO 1716: Reaction to fire tests for products - Determination of the gross heat of combustion (calorific value)
- vi. EN 13501-1: Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.
- vii. ASTM E648, Standard test method for critical radiant flux of floor covering systems using a radiant heat source
- viii. EN ISO 9239-1 Reaction to fire tests for floorings -- Part 1: Determination of the burning behavior using a radiant heat source.
- ix. NFPA 253, Standard method of test for critical radiant flux of floor covering systems using a radiant heat energy source.
- x. ULc - S102.2, Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.

#### 7.1.11. Thermal Barriers (Temperature rise shall not exceed 250° C on unexposed surface)

- i. The average temperature rise of the unexposed surface shall not rise more than 250°C after 15 minutes of fire exposure as per ASTM E 119 or UL 263. The thermal barrier shall remain in place for not less than 15 minutes as per UL 1040 or UL 1715.
- ii. NFPA 275, Standard Method of Fire Tests for the Evaluation of Thermal Barriers Used Over Foam Plastic Insulation
- iii. EN 1364-1 Fire resistance tests for non-loadbearing elements. Walls



#### 7.1.12. Through– penetration Fire stop System

- i. ASTM E 814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops
- ii. UL 1479, Standard for Safety for Fire Tests of Through-Penetration Fire Stop
- iii. EN 1366-3: Fire resistance tests for penetration seals
- iv. UL 263, Standard for Fire Tests of Building Construction and Materials.
- v. FM 4990, Approval standard for firestopping.

#### 7.1.13. Fire resistant Joint System

- i. ASTM E 1966, Standard Test Method for Fire-Resistive Joint Systems
- ii. UL 2079, Standard for Tests for Fire Resistance of Building Joint Systems.
- iii. EN 1366-4: Fire resistance tests for service installations. Linear joint seals
- iv. FM 4990, Approval standard for firestopping.

#### 7.1.14. Membrane Fire stop System

- i. ASTM E 814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops
- ii. UL 1479, Standard for Safety for Fire Tests of Through-Penetration Fire Stop
- iii. EN 1366-3: Fire resistance tests for penetration seals
- iv. UL 263, Standard for Fire Tests of Building Construction and Materials.
- v. FM 4990, Approval standard for firestopping.
- vi. EN 1366-4: Fire resistance tests for service installations. Linear joint seals



#### 7.1.15. Fire resistance rated Glazing in Doors and Walls is acceptable with following

- i. ASTM E 119, Standard Test Methods for Fire Tests of Building Construction and Materials
- ii. UL 263, Standard for Fire Tests of Building Construction and Materials.
- iii. EN 1364-1, Fire resistance tests for non-loadbearing elements - Part 1: Walls;
- iv. EN 1634 - 1, Fire resistance test for door and shutter assemblies and openable windows
- v. EN 15254-4: Extended application of results from fire resistance tests - Non-loadbearing walls - Part 4: Glazed constructions
- vi. BS 476-22: Fire tests on building materials and structures - part 22: Methods for the determination of the fire resistance of non-loadbearing elements of construction.
- vii. UL 10B, Standard for Fire Tests of Door Assemblies

#### 7.1.16. Fire retardant coatings

- i. ASTM E 276, Standard Test Method for Extended Duration Surface Burning Characteristics of Building Materials.
- ii. EN 13381-4, Test methods for determining the contribution to the fire resistance of structural members - Part 4: Applied passive protection to steel members
- iii. EN 13381-8, Test methods for determining the contribution to the fire resistance of structural members - Part 8: Applied reactive protection to steel members

#### 7.1.17. Perimeter fire barrier system/Exterior curtainwall/floor intersection

- i. ASTM E 2307, Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus
- ii. UL 2079, Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-Story Test Apparatus,
- iii. EN 1364-4 Fire resistance tests for non-loadbearing elements. Curtain walling. Part configuration
- iv. EN 1364-3, Fire resistance tests for non-loadbearing elements. Curtain walling. Full configuration (complete assembly)

#### 7.1.18. Glazing in door assembly

- i. NFPA 252, Standard methods of fire tests of door assemblies.
- ii. UL 10B/10C, Standard for Fire Tests of Door Assemblies/ Standard for Positive Pressure Fire Tests of Door Assemblies.
- iii. EN 1634 - 1, Fire resistance test for door and shutter assemblies and openable windows
- iv. BS 476-22: Fire tests on building materials and structures - part 22: Methods for the determination of the fire resistance of non-loadbearing elements of construction



#### 7.1.19. Plastic skylights on roof assembly (See classification requirements Table 1.22)

- i. FM 4431, Approval standard for skylights.
- ii. ASTM E 84, Standard Test Method of Surface Burning Characteristics of Building Materials.
- iii. EN 13501-5: Fire classification of construction products and building elements - Part 5: Classification using data from external fire exposure to roofs tests
- iv. UL 723, Standard for Test of Surface Burning Characteristics of Building Materials.
- v. BS 476-7: Surface Flammability test to Building Material
- vi. EN 13501-2 with Fire Test to Building Material - Classification
- vii. CEN/TS 1187: Test methods for external fire exposure to roofs.
- viii. ANSI/UL 790, Standard Test Methods for Fire Tests of Roof Covering.

#### 7.1.20. Roof Assemblies (Exterior fire exposure, See classification requirements in Table 1.22.)

- i. BS 476-3: Standard Test Methods for Fire Tests of Roof Coverings.
- ii. EN 13501-5: Fire classification of construction products and building elements. Classification using data from external fire exposure to roofs tests.
- iii. NFPA 276, Standard method of fire test for determining the heat release rate of roofing assemblies with combustible above-deck roofing components
- iv. FM 4470, Approval standard for single ply, polymer modified bitumen sheet, built-up roof (BUR) and liquid applied roof assemblies for use in Class 1 and non combustible roof construction.
- v. FM 4471, Approval standard for Class 1 panel roofs.
- vi. CEN/TS 1187: Test methods for external fire exposure to roofs.
- vii. LPS 1505 Requirements and tests for the LPCB approval and listing of roofing systems - protection against fire from outside the building.

#### 7.1.21. Roof Assemblies (Interior fire exposure, See classification requirements in Table 1.22.)

- i. FM 4450, Approval standard for Class 1 insulated steel roof deck roofs.
- ii. UL1256, Standard for Fire Test of Roof Deck **Constructions**.
- iii. FM 4471, Approval standard for Class 1 panel roofs.

#### 7.1.22. Roof Coverings

- i. FM 4470, Approval standard for single ply, polymer modified bitumen sheet, built-up roof (BUR) and liquid applied roof assemblies for use in Class 1 and non combustible roof construction.
- ii. ANSI/UL 790, Standard Test Methods for Fire Tests of Roof Covering.
- iii. ASTM E 108, Standard Test Methods for Fire Tests of Roof Coverings.
- iv. UL1256, Standard for Fire Test of Roof Deck **Constructions**.
- v. NFPA 256, Standard methods of fire tests of roof coverings
- vi. BS 476-3: Standard Test Methods for Fire Tests of Roof Coverings.
- vii. CEN/TS 1187: Test methods for external fire exposure to roofs
- viii. EN 13501-5: Fire classification of construction products and building elements - Part 5: Classification using data from external fire exposure to roofs tests
- ix. LPS 1505 Requirements and tests for the LPCB approval and listing of roofing systems - protection against fire from outside the building.



**7.1.23. Foam Plastic used in freezer rooms shall have flash and self ignition not less than 427<sup>o</sup> C with**

- i. ASTM D 1929, Standard Test Method for Determining Ignition Temperature of Plastics.
- ii. LPS 1181 -2 Requirements and tests for sandwich panels and built up systems for use as internal constructions in buildings.

**7.1.24. Factory manufactured or prefabricated panels with foam plastic insulation. (See Sandwich panels, Table 1.17.a,b,c for specific details)**

- i. NFPA285, Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components. (Exterior wall applications)
- ii. EN 13823: Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item.
- iii. EN-ISO 11925-2: Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test
- iv. EN-ISO 1182: Reaction to fire tests for products - Non-combustibility test and EN-ISO 1716: Reaction to fire tests for products - Determination of the gross heat of combustion (calorific value)
- vi. EN 13501-1: Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests
- vii. LPS 1181 -2 Requirements and tests for sandwich panels and built up systems for use as internal constructions in buildings.
- viii. EN 13163 - Thermal insulation products for buildings - Factory made expanded polystyrene (EPS) products - Specification
- ix. EN 13164 - Thermal insulation products for buildings - Factory made extruded polystyrene foam (XPS) products - Specification
- x. EN 13165 - Thermal insulation products for buildings - Factory made rigid polyurethane foam (PU) products - Specification
- xi. EN 13166 - Thermal insulation products for buildings - Factory made phenolic foam (PF) products - Specification
- xii. EN 13167 - Thermal insulation products for buildings - Factory made cellular glass (CG) products - Specification.

**7.1.25. MCM/ ACP and core**

- i. See Chapter 1, **Table 1.14.a.**

**7.1.26. MCM and ACP Panel Wall Systems as Assembly**

- i. See Chapter 1, **Table 1.14.b.**

**7.1.27. EIFS/ETICS**

- i. See Chapter 1, Table 1.15.a. and Table 1.15.b.

**7.1.28. PEWFS Wall System**

- i. See Chapter 1, **Table 1.16.a.** and **Table 1.16.b.**



#### **7.1.29. Sandwich Panels**

- i. See Chapter 1, **Table 1.17.a.** , **Table 1.17.b.** and **Table 1.17.c.**

#### **7.1.30. Doors Assemblies shall satisfy any of the following**

- i. UL 10B/10C, Standard for Fire Tests of Door Assemblies/ Standard for Positive Pressure Fire Tests of Door Assemblies
- ii. NFPA 252, Standard methods of fire tests of door assemblies
- iii. EN 1634-1: Fire resistance and smoke control tests for door, shutter and, openable window assemblies and elements of building hardware. Fire resistance tests for doors, shutters and openable windows
- iv. BS 476: Part 22, Methods of determination of fire resistance of non load bearing elements of construction.
- v. EN 1364-1: Fire resistance tests for non-loadbearing elements: Part 1 - Walls

#### **7.1.31. Window Assemblies shall satisfy any of the following**

- i. UL 9, Standard for Fire Tests of Window Assemblies.
- ii. NFPA 257, Standard on fire test for window and glass block assemblies.
- iii. EN 1634-1: Fire resistance and smoke control tests for door, shutter and, openable window assemblies and elements of building hardware. Fire resistance tests for doors, shutters and openable windows.
- iv. ASTM E 119, Standard Test Methods for Fire Tests of Building Construction and Materials

#### **7.1.32. Upholstered furniture**

- i. 16 CFR 1634 Flammability Test to Upholstered furniture.
- ii. EN 1021-1, Fire test to upholstered furniture (Smouldering cigarette)
- iii. BS 7176, Fire test to upholstered furniture for non domestic seating.
- iv. BS 5852: Methods of test for assessment of the ignitability of upholstered seating by smoldering and flaming ignition sources.
- v. ASTM 1537, Standard Test Method for Fire Testing of Upholstered Furniture
- vi. EN 1021-2, Fire test to upholstered furniture (Match flame)
- vii. UL 1286, Standard for Office Furnishings

#### **7.1.33. Fire Damper (90 minutes and 3 hour fire rated)**

- i. ANSI/UL 555, Standard for Fire Dampers.
- ii. EN 1366-2 Fire resistance tests for service installations. Fire dampers.
- iii. EN 13501-3: Fire classification of construction products and building elements - Part 3: Classification using data from fire resistance tests on products and elements used in building service installations: fire resisting ducts and fire dampers

#### **7.1.34. Combination (Fire/Smoke) Damper (90 minutes and 3 hour fire rated )**

- i. ANSI/UL 555, Standard for Fire Dampers, and ANSI/UL 555S, Standard for Smoke Dampers.
- ii. EN 1366-10 Fire resistance tests for service installations. Smoke control dampers.
- iii. EN 13501-3: Fire classification of construction products and building elements - Part 3: Classification using data from fire resistance tests on products and elements used in building service installations: fire resisting ducts and fire dampers



**7.1.35. Glazing System on non load bearing wall/ Curtainwall system shall satisfy any of the following**

- i. ASTM E 119, Standard Test Methods for Fire Tests of Building Construction and Materials.
- ii. EN 1364-3, Fire resistance tests for non-loadbearing elements. Curtain walling. Full configuration (complete assembly)
- iii. UL 263, Standard for Fire Tests of Building Construction and Materials.
- iv. NFPA 251, Standard methods of tests of fire resistance of building construction and materials.
- v. EN 1364-1: fire resistance tests for non-loadbearing elements. part 1: walls.
- vi. BS 476: Part 22, Methods of determination of fire resistance of non load bearing elements of construction.

**7.1.36. Glazing System on load bearing floor/roof shall satisfy any of the following**

- i. ASTM E 119, Standard Test Methods for Fire Tests of Building Construction and Materials.
- ii. UL 263, Standard for Fire Tests of Building Construction and Materials.
- iii. NFPA 251, Standard methods of tests of fire resistance of building construction and materials.
- iv. EN 1365-2: Fire resistance tests for loadbearing floor/roof.
- v. BS 476-21: Fire tests on building materials and structures - part 21: Methods for the determination of the fire resistance of loadbearing elements of construction

**7.1.37. Safety Glazing shall satisfy any of the following**

- i. EN 12600, Glass in building - Pendulum test - Impact test method and classification for flat glass.
- ii. ANSI Z97, American National Standard for Safety Glazing Materials Used in Buildings -Safety Performance Specifications and Methods of Test
- iii. CPSC 16 CR 1202
- iv. For shower enclosures: EN 14428, Shower enclosures - Functional requirements and test methods

**7.1.38. Structural Steelwork Test standards**

- i. BS 5950 The structural use of steelwork in buildings
- ii. BS 5950-8: 2003 Structural use of steelwork in buildings – Part 8; Code of Practice for fire resistant design
- iii. BS 476-20: 1987 Method for determination of the fire resistance of load bearing elements of construction (general principles)
- iv. BS 476-21: 1987 Method for determination of the fire resistance of load bearing elements of construction
- v. BS 476-23: 1987 Methods for determination of the fire resistance of the contribution of components to the fire resistance of a structure.



### 7.1.39. Structural Steelwork Test standards

- i. BS 5950 The structural use of steelwork in buildings
- ii. BS 5950-8: 2003 Structural use of steelwork in buildings – Part 8; Code of Practice for fire resistant design
- iii. BS 476-20: Method for determination of the fire resistance of load bearing elements of construction (general principles)
- iv. BS 476-21: Method for determination of the fire resistance of load bearing elements of construction
- v. BS 476-23: Methods for determination of the fire resistance of the contribution of components to the fire resistance of a structure.
- vi. EN 1363-1, Fire resistance tests — Part 1: General requirements
- vii. EN 1363-2, Fire resistance tests — Part 2: Alternative and additional procedures
- viii. EN 1365-3, Fire resistance tests for loadbearing elements — Part 3: Beams
- ix. EN 1365-4, Fire resistance tests for loadbearing elements — Part 4: Columns
- x. EN 1993-1-1, Eurocode 3: Design of steel structures — Part 1-1: General rules and rules for buildings
- xi. EN 1993-1-2, Eurocode 3: Design of steel structures — Part 1-2: General rules — Structural fire design
- xii. EN 13381-4, Test methods for determining the contribution to the fire resistance of structural members - Part 4: Applied passive protection to steel members
- xiii. EN 13381-8, Test methods for determining the contribution to the fire resistance of structural members - Part 8: Applied reactive protection to steel members.

### 7.1.40. Kiosks shall be Class A with any of the following

- i. Particleboard conforming to Type PBU of ANSI A208.1., not less than 6.4 mm thick.
- ii. Foamed plastics having a maximum heat release rate not greater than 100 kW when tested in accordance with UL1975 or in accordance with NFPA289, Standard Method of Fire Test for Individual Fuel Packages, using the 20 kW ignition source.
- iii. Textile conforming to NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films or **section 7.1.10.** of this chapter.
- iv. Metal Composite Panels conforming to **Section 7.1.24.** of this chapter.

### 7.1.41. Membrane Structure shall be Class A with any of the following

- i. ASTM E 84, Standard Test Method of Surface Burning Characteristics of Building Materials
- ii. UL 723, Standard for Test of Surface Burning Characteristics of Building Materials.
- iii. BS 476 Part 7: Fire Tests on Building materials and structures; method of test to determine the classification of the surface spread of flame of products
- iv. EN 13501-1 Fire classification of construction products and building elements. Classification using test data from reaction to fire tests
- v. NFPA 701, Fire test to textiles and films.



#### 7.1.42. Tents shall be Class A with any of the following

- i. NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.
- ii. EN 13501-1 Fire classification of construction products and building elements. Classification using test data from reaction to fire tests
- iii. ASTM E 84, Standard Test Method of Surface Burning Characteristics of Building Materials
- iv. UL 723, Standard for Test of Surface Burning Characteristics of Building Materials.
- iv. BS 476 Part 7: Fire Tests on Building materials and structures; method of test to determine the classification of the surface spread of flame of products

#### 7.1.43. Air-Inflated Structure and Air-Supported Structure

- i. Shall be designed and operated in accordance with ASCE/SEI 17, Air Supported Structures.

#### 7.1.44. Advertising Billboards (Using Combustible Materials)

- i. NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.
- i. ASTM E 84, Standard Test Method of Surface Burning Characteristics of Building Materials
- ii. UL 723, Standard for Test of Surface Burning Characteristics of Building Materials
- iii. NFPA 265., Standard methods of fire tests for evaluating room fire growth contribution of textile or expanded vinyl wall coverings on full height panels and walls.

#### 7.1.45. Non-Combustible Material for Cavity Fire Barrier (Groove sealants, Gaskets, Backer Rod and vapour barrier systems)

- i. EN 13501-1, Class A1 or A2 (Fire classification of construction products and building elements. Classification using test data from reaction to fire tests)
- ii. BS 476-4, Non-Combustible (Fire classification of construction products and building elements. Classification using test data from reaction to fire tests)
- iii. ISO 1182, Non-Combustible (Fire classification of construction products and building elements. Classification using test data from reaction to fire tests)
- iv. **Gaskets**, tested to EN 13501-1 and achieving class B-s2-d0 or C-s2-d0 shall be permitted.
- v. **EPDM** products, Rubber sheeting and architectural carpets tested to EN 13501-1 and achieving class B-s2-d0 or C-s2-d0 shall be permitted.
- vi. **Artificial Turf**. See **Chapter 1, Section 4, 4.5.6.4.** for test requirements.

#### 7.1.46. Modular Homes/Offices

- i. Class B, with ASTM E-84, Standard Test for Surface Burning Characters
- i. Class B with UL 723, Standard Test for Surface Burning Characters
- ii. Limited Combustible, with FM 4880, Standard test for insulated wall panels

#### 7.1.47. GRC/ GRFC/ GRP Panels

- i. See Chapter 1, **Table 1.18.a.** and **Table 1.18.b.**

## A2. Drawing Submission Requirements

### A2.9. Façade, Cladding, Curtainwall and Roofing report submissions

**A2.9.1.** Façade, Cladding, curtainwall and roofing proposals and drawings shall comply with the **Table A.2.8.**

**Table A2.8.: Cladding, Curtainwall and Roofing Proposal Submissions**

| ITEM                            | REQUIREMENTS  |
|---------------------------------|---|
| <b>1. AUTHORIZED APPLICANT</b>  | <ul style="list-style-type: none"> <li>i. Façade, Cladding, Curtainwall and Roofing submissions to Civil Defence shall only be submitted through Civil Defence approved House of Expertise OR the Main Consultant OR the Façade Consultant having qualified personnel as per <b>Chapter 1, Section 4.4.7.5 and 4.4.8.</b></li> <li>ii. It is House of Expertise or Main Consultant OR Façade Consultant’s responsibility to understand the requirements of UAE Fire and Life Safety Code of Practice, material test requirements, Civil Defence registration of contractors and suppliers and the report submission format.</li> </ul>  |
| <b>2. REPORT FORMAT</b>         | <ul style="list-style-type: none"> <li>i. Report shall <u>essentially follow</u> the following format. <ul style="list-style-type: none"> <li>a. All reports shall be in pdf format.</li> <li>b. It is applicants responsibility to recreate soft copies of the sample formats shown in this table and adhere to submission format.</li> <li>c. It is applicants responsibility to submit error free pdf files such that Civil Defence stamp as “water mark” can be inserted into the pdf files without glitch.</li> <li>d. A cover page –1 page as per <b>Format A2.9.1.: Cover page format and sample.</b></li> <li>e. Under taking declarations from each involved party—1 page as per <b>Table A.2.8.4. Stamped undertaking declarations.</b>, followed by their civil defence valid certificate and followed by CoC from certification body—5 pages MAXIMUM as shown in <b>Sample A2.9.12.</b></li> <li>f. An engineering evaluation and assessment—3 pages MAXIMUM as per format and Table shown in <b>Format A2.9.13.</b> Non-compliances shall be clearly conveyed in the assessment.</li> <li>g. Sectional schematics –3 pages as shown in <b>Format A2.9.14.</b> Schematics shall depict exact design and site conditions, clearly labeling the components, dimensions and materials.</li> <li>h. An inspection report—3 pages MAXIMUM as per format and Table shown in <b>Format A2.9.15.</b></li> </ul> </li> </ul> |
| <b>3. UN ACCEPTABLE REPORTS</b> | <ul style="list-style-type: none"> <li>i. Reports not complying to <b>Table A2.8.</b> shall not be reviewed and shall not be acceptable.</li> <li>ii. Reports submitted by parties other than Civil Defence approved house of expertise shall not be acceptable.</li> <li>iii. <b>DO NOT</b> submit product catalogues and brochures.</li> <li>iv. <b>DO NOT</b> provide generalized technical description of how and why fire spreads.</li> <li>v. <b>DO NOT</b> provide Test standard methods and details.</li> <li>vi. <b>DO NOT</b> submit without stamps and signatures, where applicable as per format samples.</li> <li>vii. <b>DO NOT</b> provide irrelevant and unnecessary attachments.</li> </ul>  |

## A2. Drawing Submission Requirements

### A2.9. Façade, Cladding, Curtainwall and Roofing proposal submissions

Table A2.8.: Cladding, Curtainwall and Roofing Proposal Submissions

| ITEM  | REQUIREMENTS  |
|---|---|
| <p><b>3. UNACCEPTABLE REPORTS</b></p>             | <ul style="list-style-type: none"> <li>viii. <b>DO NOT</b> submit reports for projects where suppliers are not registered with Civil Defence. It is main consultants and contractors responsibility to get suppliers approach Civil Defence for their registration.</li> <li>ix. Reports clearly and efficiently not highlighting non-compliances shall not be acceptable.</li> <li>x. <b>DO NOT SUBMIT REPORTS JUSTIFYING NON-COMPLIANT CLADDING AND ROOFING MATERIALS.</b></li> </ul>   |
| <p><b>4. STAMPED UNDERTAKING DECLARATIONS</b></p> | <ul style="list-style-type: none"> <li>i. Every party involved in the project shall furnish undertaking declarations as follows.               <ul style="list-style-type: none"> <li>a. House of Expertise OR Main consultant OR Façade Consultant—1 page as per <b>Format Sample A2.9.2.: House of Expertise/ Main Consultant/Façade Consultant undertaking letter format and sample.</b></li> <li>b. Main consultant—1 page as per <b>Format Sample A2.9.3.: Main consultant undertaking letter format and sample.</b></li> <li>c. Main contractor—1 page as per <b>Format Sample A2.9.4.: Main contractor undertaking letter format and sample.</b></li> <li>d. Panel supplier—1 page as per <b>Format Sample A2.9.5.: ACP/MCM/SOLID METAL/PEWFS/ GRC panel Supplier undertaking letter format and sample.</b></li> <li>e. EIFS/ETICS supplier—1 page as per <b>Format Sample A2.9.6.: EIFS/ ETICS Supplier undertaking letter format and sample.</b></li> <li>f. Natural stone supplier—1 page as per <b>Format Sample A2.9.7.: Natural stone Supplier undertaking letter format and sample.</b></li> <li>g. Firestopping system supplier—1 page as per <b>Format Sample A2.9.8.: Fire-stopping system Supplier undertaking letter format and sample.</b></li> <li>h. Insulation material supplier—1 page as per <b>Format Sample A2.9.9.: Insulation material Supplier undertaking letter format and sample.</b></li> <li>i. Roofing panel supplier—1 page as per <b>Format Sample A2.9.10.: Roofing panel Supplier undertaking letter format and sample.</b></li> <li>j. Glazing supplier—1 page as per <b>Format Sample A2.9.11.: Roofing panel Supplier undertaking letter format and sample.</b></li> </ul> </li> </ul> |

## A2. Drawing Submission Requirements

### A2.9. Façade, Cladding, Curtainwall and Roofing proposal submissions

FULL BUILDING IMAGE IN COLOUR



**BUILDING NAME:** XXXX  
**PLOT NUMBER:** XXXX  
**CLIENT NAME:** XXXX  
**FIRE CONSULTANT/FAÇADE CONSULTANT NAME:** XXXX  
**CONSULTANT NAME:** XXXX  
**MAIN CONTRACTOR NAME:** XXXX  
**FAÇADE SUB CONTRACTOR NAME:** XXXX  
**FABRICATOR/ INSTALLER NAME:** XXXX

**BUILDING AUTHORITY:** MUNICIPALITY/ DCCA/ FREE ZONE  
**FAÇADE APPROVAL AUTHORITY:** CIVIL DEFENCE

**REPORT REFERENCE NUMBER:** XXXX  
**DATE:** XXXX  
**PREPARED BY:** NAME+STAMP+SIGNATURE

**SYSTEMS EVALUATED:**  Façade  Curtainwall  Cladding  Roofing  
 Architectural feature  Glazing  Others \_\_\_\_\_

**CIVIL DEFENCE COMMENTS AND STAMP:**  Approved with comments  Not Acceptable

Format A2.9.1.: Cover page format and sample

## A2. Drawing Submission Requirements

### A2.9. Façade, Cladding, Curtainwall and Roofing proposal submissions

HOUSE OF EXPERTISE /FAÇADE CONSULTANT/ MAIN CONSULTANT LETTERHEAD

Date:

Report Reference number:

Ministry of Interior

General Directorate of Civil Defence

Department of Preventive Safety

Kind Attn: Director – Preventive Safety Dept.

Subject: Undertaking | Exterior Façade/Curtainwall/Cladding/Roofing System

Project:

Plot No.:

Project Consultant:

Based on submitted design, material listing and installation method statement documents, following systems have been evaluated.

|  |   |   |   |
|--|---|---|---|
| <input checked="" type="checkbox"/> Façade | <input checked="" type="checkbox"/> ACP | <input type="checkbox"/> Natural Stone  | <input type="checkbox"/> Glazing              |
| <input type="checkbox"/> Curtainwall       | <input type="checkbox"/> GRC            | <input type="checkbox"/> Concrete Panel | <input checked="" type="checkbox"/> MgO Board |
| <input type="checkbox"/> Cladding          | <input type="checkbox"/> Polycarbonate  | <input type="checkbox"/> Solid Metal    | <input type="checkbox"/> Sandwich Panel       |
| <input type="checkbox"/> Roofing           | <input type="checkbox"/> EIFS           | <input type="checkbox"/> ETICS          | <input type="checkbox"/> other (Specify):     |

In addition, Consultant's undertaking and the approved material submittal(s) has/have also been reviewed by us.

1. We undertake that the above mentioned systems are compliant to latest UAE Fire and Life Safety Practice, 2017. Please see attached report. (Report Reference Number: xxxxx)
2. We undertake that the installed work shall be inspected to ensure that the provisions of Civil Defence approval are adhered to. Inspection reports shall be prepared for each stage at 20%, 40%, 60%, 80% & 100% and shall be submitted to Civil Defence inspection team.
3. We will ensure that all stakeholders - main consultant, the manufacturer, the installer and house of expertise jointly sign off the installation and provide final inspection report for Civil Defence acceptance as evidence of compliance.

Hence, we request Civil Defence to approve the proposed façade system(s) for this project.

Thanks & Regards,

Name:

Designation:

For & on behalf of (the HoE/ Façade /Main consultant)

Organization Stamp

Format Sample A2.9.2.: House of Expertise undertaking letter format and sample

## A2. Drawing Submission Requirements

### A2.9. Façade, Cladding, Curtainwall and Roofing proposal submissions

#### MAIN CONSULTANT LETTERHEAD

Date:

Report Reference number:

**Ministry of Interior**

General Directorate of Civil Defence

Department of Preventive Safety

**Kind Attn: Director – Preventive Safety Dept.**

**Subject: Undertaking | Exterior Façade/Curtainwall/Cladding/Roofing System**

**Project:**

**Plot No.:**

**Project Consultant:**

We hereby confirm that the following systems have been designed to the latest edition of UAE Fire and Life Safety Code of Practice.

- |  |   |   |   |
|--|---|---|---|
| <input checked="" type="checkbox"/> Facade | <input checked="" type="checkbox"/> ACP | <input type="checkbox"/> Natural Stone  | <input type="checkbox"/> Glazing              |
| <input type="checkbox"/> Curtainwall       | <input type="checkbox"/> GRC            | <input type="checkbox"/> Concrete Panel | <input checked="" type="checkbox"/> MgO Board |
| <input type="checkbox"/> Cladding          | <input type="checkbox"/> Polycarbonate  | <input type="checkbox"/> Solid Metal    | <input type="checkbox"/> Sandwich Panel       |
| <input type="checkbox"/> Roofing           | <input type="checkbox"/> EIFS           | <input type="checkbox"/> ETICS          | <input type="checkbox"/> other (Specify):     |

We have approved the above-proposed material submittals for this project. We undertake that only Civil Defence approved products/systems shall be used.

We undertake that inspection of on-site installation at 20%, 40%, 60%, 80% & 100% shall be conducted and reports for each stage shall be submitted to Civil Defense inspection team.

We also understand and agree that in case of failure to implement the provisions of this approval, Civil Defence may withdraw the approval unconditionally.

Thanks & Regards,

Name:

Designation:

For & on behalf of (Main consultant)

Organization Stamp

**Format Sample A2.9.3.: Main Consultant undertaking letter format and sample**

## A2. Drawing Submission Requirements

### A2.9. Façade, Cladding, Curtainwall and Roofing proposal submissions

#### CONTRACTOR LETTERHEAD

Date:

Report Reference number:

**Ministry of Interior**

General Directorate of Civil Defence

Department of Preventive Safety

Kind Attn: Director – Preventive Safety Dept.

Subject: Undertaking | Fabrication of Exterior Façade/ Roofing/ Architectural feature

Project:

Plot No.:

Project Consultant:

We hereby confirm that the following systems have been fabricated and installed to the latest edition of UAE Fire and Life Safety Code of Practice.

- |  |   |   |   |
|--|---|---|---|
| <input checked="" type="checkbox"/> Facade | <input checked="" type="checkbox"/> ACP | <input type="checkbox"/> Natural Stone  | <input type="checkbox"/> Glazing              |
| <input type="checkbox"/> Curtainwall       | <input type="checkbox"/> GRC            | <input type="checkbox"/> Concrete Panel | <input checked="" type="checkbox"/> MgO Board |
| <input type="checkbox"/> Cladding          | <input type="checkbox"/> Polycarbonate  | <input type="checkbox"/> Solid Metal    | <input type="checkbox"/> Sandwich Panel       |
| <input type="checkbox"/> Roofing           | <input type="checkbox"/> EIFS           | <input type="checkbox"/> ETICS          | <input type="checkbox"/> other (Specify):     |

We confirm and undertake that only Civil Defence approved designs, tested systems, methods and products/systems shall be used and installed by qualified personnel.

We undertake that inspection of on-site installation at 20%, 40%, 60%, 80% & 100% shall be initiated, coordinated and ensure that reports for each stages are prepared.

We also understand and agree that in case of failure to implement the provisions of this approval, Civil Defence may withdraw the approval unconditionally.

Thanks & Regards,

Name:

Designation:

For & on behalf of (Main consultant)

Organization Stamp

Format Sample A2.9.4.: Contractor/ Fabricator undertaking letter format and sample

## A2. Drawing Submission Requirements

### A2.9. Façade, Cladding, Curtainwall and Roofing proposal submissions

#### CLADDING PANEL SUPPLIER LETTERHEAD

Date:

Report Reference number:

Ministry of Interior

General Directorate of Civil Defence

Department of Preventive Safety

Kind Attn: Director – Preventive Safety Dept.

Subject: Undertaking | ACP / MCM / SOLID METAL / POLYCARBONATE / GRC / SANDWICH PANEL  
COMPLIANCE WHEN INSTALLED ON FAÇADE OR EXETRIOR OR AS ARCHITECTURE FEATURE

Project:

Plot No.:

Project Consultant:

We undertake that the proposed cladding and facade material/system complies with the latest edition of UAE Fire and Life Safety Code of Practice requirements.

|  |  |   |   |
|--|--|---|---|
| Product/System: xxxx (Material Description i.e. FR or FR A2) |  |   |   |
| 1. UAE Fire and Life Safety Code of Practice Compliance      |  |   |   |
| <b>1.1. PRODUCT AND PANEL TEST</b>                           |  |   |   |
| 1.1.1.   | EN13501-1: Achieves Class A-s1-d0 or Class A2-s1-d0      | <input checked="" type="checkbox"/>     |   |
| 1.1.2.   | EN13501-1: Achieves Class B-s1-d0                        | <input type="checkbox"/>                |   |
| 1.1.3.   | ASTM D1929: Achieves Self-ignition temperature of 343 °C | <input checked="" type="checkbox"/>     |   |
| <b>1.2. ASSEMBLY TEST</b>                                    |  |   |   |
| 1.2.1.   | NFPA 285 OR FM 4881 OR BS 8414-1/2 OR ISO 13785-2        | <input checked="" type="checkbox"/>     |   |
| 1.2.2.   | ASTM E-119 OR UL263 OR EN 1362-3 OR EN1362-4             | <input checked="" type="checkbox"/>     |   |
| 2.   | Registered with Civil Defense                            | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> On-going <input type="checkbox"/> |
| 3.   | Valid Civil Defense License                              | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> On-going <input type="checkbox"/> |

We further undertake that the same material shall be supplied to this project.

Thanks & Regards,

Name:

Designation:

For & on behalf of xxxxx (The Supplier)

Organization Stamp

Format A2.9.5.: ACP/MCM/SOLID METAL/PEWFS/ GRC panel Supplier undertaking letter format and sample

## A2. Drawing Submission Requirements

### A2.9. Façade, Cladding, Curtainwall and Roofing proposal submissions

EIFS / ETICS SUPPLIER LETTERHEAD

Date:

Report Reference number:

Ministry of Interior  
General Directorate of Civil Defence  
Department of Preventive Safety

Kind Attn: Director – Preventive Safety Dept.

Subject: Undertaking | EIFS/ETICS COMPLIANCE

Project:

Plot No.:

Project Consultant:

We undertake that the proposed cladding material/system complies with the latest edition of UAE Fire and Life Safety Code of Practice requirements.

|  |   |                                     |                                   |
|--|---|-------------------------------------|-----------------------------------|
| Product/System: xxxx (Material Description i.e. FR or FR A2)                       |   |                                     |                                   |
| 1. UAE Fire and Life Safety Code of Practice Compliance                            |   |                                     |                                   |
| 1.1. <u>PRODUCT AND PANEL TEST</u>   |   |                                     |                                   |
| 1.1.1. ASTM E-84: Achieves Class A (For all layers, XPS, Insulation, mesh, finish) |   | <input checked="" type="checkbox"/> |                                   |
| 1.1.2. NFPA 268: No ignition at 12.5 kw.m <sup>2</sup> , at 20 minutes             |   | <input checked="" type="checkbox"/> |                                   |
| 1.2. <u>ASSEMBLY TEST</u>  |   |                                     |                                   |
| 1.2.1. NFPA 285 OR FM 4881 OR BS 8414-1/2 OR ISO 13785-2                           |   | <input checked="" type="checkbox"/> |                                   |
| 1.2.2. ASTM E-119 OR UL263 OR EN 1362-3 OR EN1362-4                                |   | <input checked="" type="checkbox"/> |                                   |
| 2. Registered with Civil Defense   | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>         | On-going <input type="checkbox"/> |
| 3. Valid Civil Defense License   | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>         | On-going <input type="checkbox"/> |

We further undertake that the same material shall be supplied to this project.

Thanks & Regards,

Name:

Designation:

For & on behalf of xxxxx (The Supplier)

Organization Stamp

Format and Sample A2.9.6.: EIFS / ETICS Supplier undertaking letter format and sample

## A2. Drawing Submission Requirements

### A2.9. Façade, Cladding, Curtainwall and Roofing proposal submissions

#### NATURAL STONE SUPPLIER LETTERHEAD

Date:

Report Reference number:

**Ministry of Interior**

General Directorate of Civil Defence

Department of Preventive Safety

Kind Attn: Director – Preventive Safety Dept.

Subject: Undertaking | Natural Stone

Project:

Plot No.:

Project Consultant:

We hereby confirm that the stone for façade purpose supplied, is natural and quarried from natural stone. The product is not manufactured in the factory, except for milling and polishing.

- Facade       Natural Stone
- Curtainwall
- Cladding
- Roofing

We also understand and agree that in case of failure to implement the provisions of this approval, Civil Defence may withdraw the approval unconditionally.

Thanks & Regards,

Name:

Designation:

For & on behalf of (Main consultant)

Organization Stamp

Format and Sample A2.9.7.: Natural Stone Supplier undertaking letter format and sample

## A2. Drawing Submission Requirements

### A2.9. Façade, Cladding, Curtainwall and Roofing proposal submissions

FIRESTOPPING SYSTEM LETTERHEAD

Date:

Report Reference number:

Ministry of Interior  
General Directorate of Civil Defence  
Department of Preventive Safety

Kind Attn: Director – Preventive Safety Dept.

Subject: Undertaking | FIRE STOPPING MATERIAL AND SYSTEMS WHEN INSTALLED IN CURTAINWALL OR FAÇADE

Project:

Plot No.:

Project Consultant:

We undertake that the proposed and supplied firestopping material and systems complies with the latest edition of UAE Fire and Life Safety Code of Practice requirements.

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Perimeter fire barrier system | <input type="checkbox"/> Fire resistive joint system |
| <input type="checkbox"/> Cavity fire barrier system               | <input type="checkbox"/> Membrane penetration system |
| <input type="checkbox"/> Through penetration firestop systems     | <input type="checkbox"/> Others (Specify)            |

|  |   |                             |                                     |
|--|---|-----------------------------|-------------------------------------|
| Product/System: xxxx (Material Description i.e. perimeter joint system)          |   |                             |                                     |
| 1. UAE Fire and Life Safety Code of Practice Compliance                          |   |                             |                                     |
| 1.1. <b>PRODUCT AND SYSTEM TEST</b>  |   |                             | <input checked="" type="checkbox"/> |
| 1.1.1. ASTM 2307 OR UL 2079 OR EN 1364-3 OR EN 1364-3                            |   |                             | <input checked="" type="checkbox"/> |
| 1.1.2. ASTM E 814 OR UL 1479 OR EN 1366-3 OR EN 1366-4 OR UL 263 OR FM 4990      |   |                             | <input type="checkbox"/>            |
| 1.1.3. ASTM E 1966 OR UL 2079 OR FM  |   |                             | <input checked="" type="checkbox"/> |
| 1.1.4. EN 13501-1 (A1 or A2) OR BS 476-4 (Class 0) OR ISO 1182 (Non-combustible) |   |                             | <input type="checkbox"/>            |
| 2. Engineering Judgements (EJ) if any  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |                                     |
| 3. Registered with Civil Defense   | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | On-going <input type="checkbox"/>   |
| 4. Valid Civil Defense License   | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | On-going <input type="checkbox"/>   |

Thanks & Regards,

Name:

Designation:

For & on behalf of xxxxx (The Supplier)

Organization Stamp

Format and sample A2.9.8.: Firestopping system Supplier undertaking letter format and sample

## A2. Drawing Submission Requirements

### A2.9. Façade, Cladding, Curtainwall and Roofing proposal submissions

#### INSULATION MATERIAL SUPPLIER LETTERHEAD

Date:

Report Reference number:

**Ministry of Interior**

General Directorate of Civil Defence

Department of Preventive Safety

Kind Attn: Director – Preventive Safety Dept.

Subject: Undertaking | INSULATION MATERIAL

Project:

Plot No.:

Project Consultant:

We undertake that the proposed and supplied insulation material complies with the latest edition of UAE Fire and Life Safety Code of Practice requirements.

Rockwool

Glasswool

Others (Specify)

|  |   |                             |                                     |
|--|---|-----------------------------|-------------------------------------|
| Product/System: xxxx (Material Description i.e. Rockwool)                        |   |                             |                                     |
| 1. UAE Fire and Life Safety Code of Practice Compliance                          |   |                             |                                     |
| 1.1. <u>PRODUCT AND SYSTEM TEST</u>  |   |                             | <input checked="" type="checkbox"/> |
| 1.1.1. EN 13501-1 (A1 or A2) OR BS 476-4 (Class 0) OR ISO 1182 (Non-combustible) |   |                             |                                     |
| 2. Registered with Civil Defense   | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | On-going <input type="checkbox"/>   |
| 3. Valid Civil Defense License   | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | On-going <input type="checkbox"/>   |

Thanks & Regards,

Name:

Designation:

For & on behalf of xxxx (The Supplier)

Organization Stamp

Format and sample A2.9.9.: Insulation material Supplier undertaking letter format and sample

## A2. Drawing Submission Requirements

### A2.9. Façade, Cladding, Curtainwall and Roofing proposal submissions

ROOFING PANEL SUPPLIER LETTERHEAD

Date:

Report Reference number:

Ministry of Interior  
General Directorate of Civil Defence  
Department of Preventive Safety

Kind Attn: Director – Preventive Safety Dept.

Subject: Undertaking | ROOFING PANEL

Project:

Plot No.:

Project Consultant:

We undertake that the proposed Roofing material/system complies with the latest edition of UAE Fire and Life Safety Code of Practice requirements.

|  |   |                                     |                                   |
|--|---|-------------------------------------|-----------------------------------|
| Product/System: xxxx (Material Description i.e. FR or FR A2) |   |                                     |                                   |
| 1. UAE Fire and Life Safety Code of Practice Compliance      |   |                                     |                                   |
| 1.1. <u>ROOFING PANEL-EXTERIOR FIRE EXPOSURE</u>             |   |                                     |                                   |
| 1.1.1. FM 4470 Or FM 4471                                    |   | <input checked="" type="checkbox"/> |                                   |
| 1.1.2. EN13501-5: Achieves Class Broof t4                    |   | <input type="checkbox"/>            |                                   |
| 1.1.3. ASTM E 108: Achieves Class A                          |   | <input type="checkbox"/>            |                                   |
| 1.1.4. BS 476-3: Achieves Class AA                           |   | <input type="checkbox"/>            |                                   |
| 1.1.5. UL 790: Achieves Class A                              |   | <input type="checkbox"/>            |                                   |
| 1.1.6. NFPA 276: Achieves Class 1                            |   | <input type="checkbox"/>            |                                   |
| 1.2. <u>ROOFING PANEL-INTERIOR FIRE EXPOSURE</u>             |   |                                     |                                   |
| 1.2.1. FM 4450: Achieves Class 1                             |   | <input checked="" type="checkbox"/> |                                   |
| 1.2.2. UL 1256: Pass as assembly                             |   | <input type="checkbox"/>            |                                   |
| 1.3. <u>ROOFING PANEL-EXTERIOR FIRE EXPOSURE</u>             |   |                                     |                                   |
| 1.3.1. NFPA 256: Achieves Class B                            |   | <input type="checkbox"/>            |                                   |
| 1.3.2. ASTM E 108: Achieves Class B                          |   | <input type="checkbox"/>            |                                   |
| 1.3.3. BS 476-3: Achieves Class BB                           |   | <input type="checkbox"/>            |                                   |
| 1.3.4. UL 790: Achieves Class B                              |   | <input type="checkbox"/>            |                                   |
| 2. Registered with Civil Defense                             | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>         | On-going <input type="checkbox"/> |
| 3. Valid Civil Defense License                               | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>         | On-going <input type="checkbox"/> |

We further undertake that the same material shall be supplied to this project.

Thanks & Regards,

Name:

Designation:

For & on behalf of xxxxx (The Supplier)

Organization Stamp

Format A2.9.10.: Roofing panel Supplier undertaking letter format and sample

## A2. Drawing Submission Requirements

### A2.9. Façade, Cladding, Curtainwall and Roofing proposal submissions

GLAZING SUPPLIER LETTERHEAD

Date:

Report Reference number:

Ministry of Interior  
General Directorate of Civil Defence  
Department of Preventive Safety

Kind Attn: Director – Preventive Safety Dept.

Subject: Undertaking | ROOFING PANEL

Project:

Plot No.:

Project Consultant:

We undertake that the proposed Glazing system complies with the latest edition of UAE Fire and Life Safety Code of Practice requirements.

|   |   |   |
|---|---|---|
| Product/System: xxxx (Material Description i.e. FR or FR A2)                    |   |   |
| 1. UAE Fire and Life Safety Code of Practice Compliance                         |   |   |
| 1.1. <u>CURTAINWALL GLAZING PANEL, WHERE FIRE RESISTANCE RATING IS REQUIRED</u> |   | <input checked="" type="checkbox"/>                           |
| 1.1.1. NFPA 251, Pass   |   | <input type="checkbox"/>                                      |
| 1.1.2. EN1364-3: Pass   |   | <input type="checkbox"/>                                      |
| 1.1.3. UL 263: Pass   |   | <input type="checkbox"/>                                      |
| 1.1.4. ASTM E 119: Pass   |   | <input type="checkbox"/>                                      |
| 1.2. <u>NON LOAD BEARING GLAZING WALLS</u>                                      |   | <input checked="" type="checkbox"/>                           |
| 1.2.1. NFPA 251, Pass   |   | <input type="checkbox"/>                                      |
| 1.2.2. EN1364-1: Pass   |   | <input type="checkbox"/>                                      |
| 1.2.3. UL 263: Pass   |   | <input type="checkbox"/>                                      |
| 1.2.4. ASTM E 119: Pass   |   | <input type="checkbox"/>                                      |
| 1.3. <u>CEILING, FLOORING, ROOFING GLAZING</u>                                  |   | <input checked="" type="checkbox"/>                           |
| 1.3.1. NFPA 251, Pass   |   | <input type="checkbox"/>                                      |
| 1.3.2. EN1364-2: Pass   |   | <input type="checkbox"/>                                      |
| 1.3.3. UL 263: Pass   |   | <input type="checkbox"/>                                      |
| 1.3.4. ASTM E 119: Pass   |   | <input type="checkbox"/>                                      |
| 2. Registered with Civil Defense  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> On-going <input type="checkbox"/> |
| 3. Valid Civil Defense License  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> On-going <input type="checkbox"/> |

We further undertake that the same material shall be supplied to this project.

Thanks & Regards,

Name:

Designation:

For & on behalf of xxxxxx (The Supplier)

Organization Stamp

Format A2.9.11.: Glazing Supplier undertaking letter format and sample

## A2. Drawing Submission Requirements

### A2.9. Façade, Cladding, Curtainwall and Roofing proposal submissions

**إدارة السلامة الوقائية - قسم إمتداد الشركات**



دولة الإمارات العربية المتحدة  
وزارة الداخلية  
الإدارة العامة للدفاع المدني- دبي  
United Arab Emirates  
Ministry of Interior  
DCD General Directorate

Tel.: 009714 2611111  
Fax : 009714 2612449  
P.O. Box 11377 Dubai  
United Arab Emirates

**للسايرى**  
**Emergency**  
**997**  
www.dcd.gov.ae

**ترخيص وكيل - بإمارة دبي**

رقم الترخيص: K25  
سنة الترخيص: 2018  
عدد التراخيص: ( 4 - 2 )

تم اصدار الترخيص استناداً إلى القرار الوزاري رقم(24) لسنة 2012 ، في شأن تنظيم خدمات الدفاع المدني

اسم الشركة:   
اسم صاحب الترخيص:   
أطراف الرخصة:  \*\*\*  
رقم الهاتف:  رقم الفاكس:   
عنوان الشركة:   
الموقع /البريد الإلكتروني:   
تأسست بتاريخ: 2014/04/03م تاريخ الإصدار: 2018/02/11م تاريخ الانتهاء: 2019/02/14م  
عدد المعدات والأجهزة المعتمدة: 8  
عدد المهندسين المعتمدين: 0  
عدد الفنيين المعتمدين:

يعتمد/عن مدير الإدارة العامة للدفاع المدني/دبي

11/2/2018

أن تكون دولة الإمارات العربية المتحدة من أفضل دول العالم في تحقيق الأمن والسلامة

**إدارة السلامة الوقائية - قسم إمتداد الشركات**



دولة الإمارات العربية المتحدة  
وزارة الداخلية  
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**بوروكون للتجارة**

رقم الترخيص: K25  
سنة الترخيص: 2018  
عدد التراخيص: ( 2 - 4 )

اسم الشركة: بوروكون للتجارة

| م | اسم المادة   | الاسم التجاري | رقم شهادة السلامة | اسم المعيار | بلد الصنع | قيد الوثيقة | منطقة الوثيقة | تاريخ انتهاء قيد الوثيقة |
|---|--|---------------|-------------------|-------------|-----------|-------------|---------------|--------------------------|
| 3 | مجمع تكتسبات الومنيوم مقاومة للحريق<br>Aluminium Composite Panel Assembly<br>Exterior Cladding system : ALUBOND USA FR A2(Closed Joint system)<br>Panel Thickness : 4mm<br>Max. Size of the panel : 975 mm to 1065mm Width x 1633mm to 1897 mm Height<br>classification : Core & Panel ---- Class A (As per ASTM E84), Pass (As per ASTM D 1929), Class A2-s1, d0(As per EN 13501-1), Pass (As per NFPA285)<br>Usage: Exterior Cladding system allowed for any buildings |               |                   |             | UAE       | نهي         |               | 2018/12/26               |
| 4 | مجمع تكتسبات الومنيوم مقاومة للحريق<br>Aluminium Composite Panel Assembly<br>Exterior Cladding system : ALUBOND USA FR A2(Open Joint system)<br>Panel Thickness : 4mm<br>Max. Size of the panel : 1064 mm to 1961mm Width x 742mm to 944 mm Height<br>classification : Core & Panel ---- Class A (As per ASTM E84), Pass (As per ASTM D 1929), Class A2-s1, d0(As per EN 13501-1), Pass (As per NFPA285)<br>Usage: Exterior Cladding system allowed for any buildings    |               |                   |             | UAE       | نهي         |               | 2018/12/26               |

ملاحظة :  
1- يعتبر الوكيل مرخص من قبل الإدارة العامة للدفاع المدني- دبي ويحق له من اذونات تشغله في إمارة دبي فقط استناداً إلى قرار مجلس الوزراء رقم (24) لسنة 2012م في شأن تنظيم خدمات الدفاع المدني للاحتة التنفيذية رقم(24) لسنة 2012 ، ولا يحق له من اذونات تشغله في باقي الإمارات إلا بعد استعراض ترخيص مؤزم من قبل الإمارات العامة لذات الاختصاصات في كل مرة.  
2- بإذارة العامة للدفاع المدني- دبي في حقة تغير أو تعديل في البيانات المتعلقة في الترخيص الصادر من قبل الإدارة.

يعتمد/عن مدير الإدارة العامة للدفاع المدني/دبي

11/2/2018

أن تكون دولة الإمارات العربية المتحدة من أفضل دول العالم في تحقيق الأمن والسلامة

Format A2.9.12.: Civil Defence Certificate for illustration

## A2. Drawing Submission Requirements

### A2.9. Façade, Cladding, Curtainwall and Roofing proposal submissions

#### TECHNICAL ASSESSMENT

Date:

Report Reference number:

Project:

Percentage of building construction status:

Plot No.:

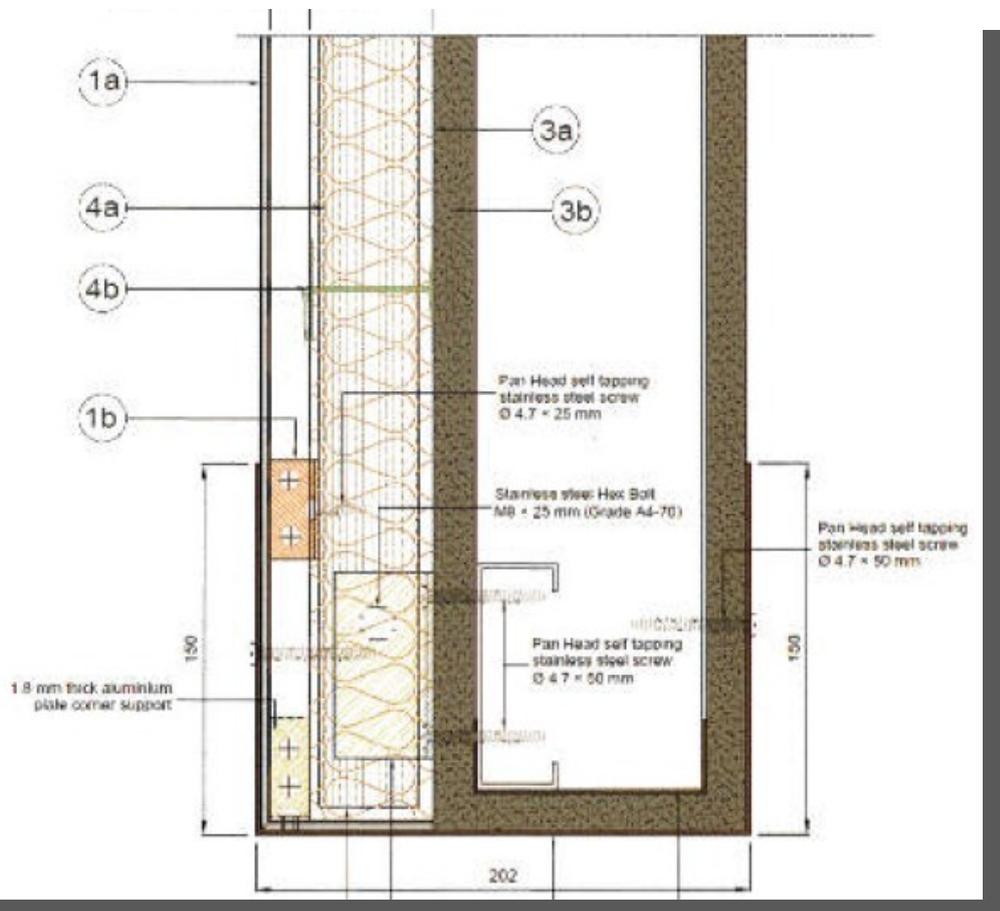
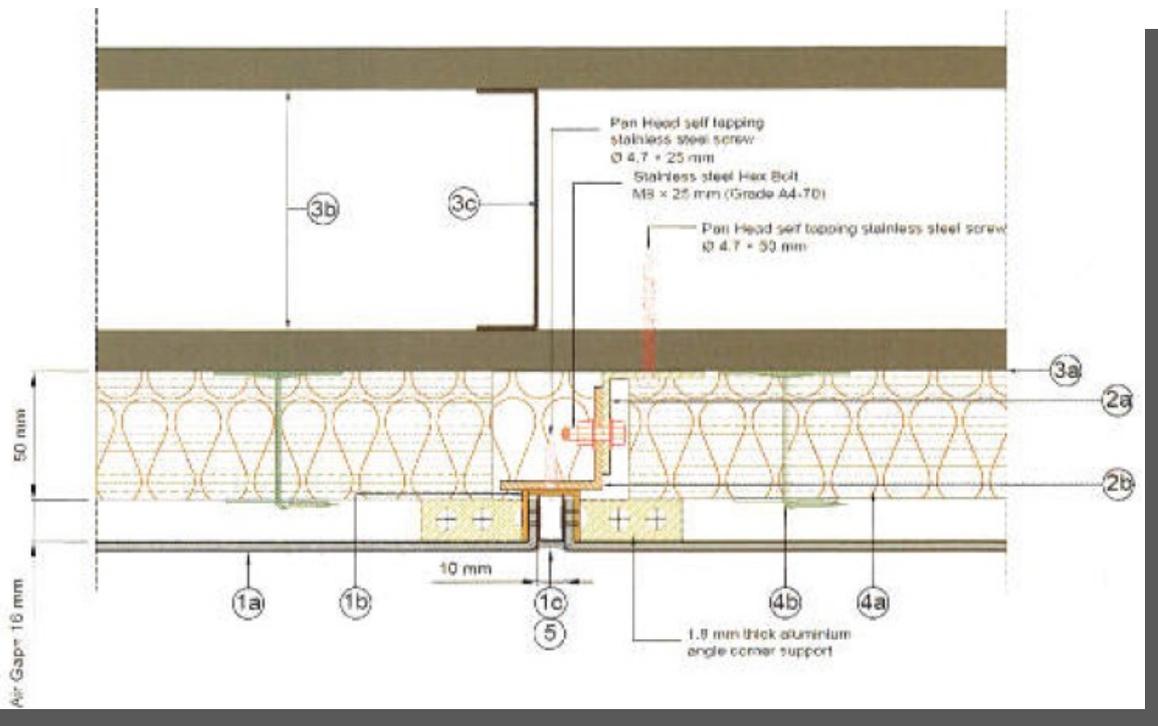
House of Expertise:

| S. No. | SYSTEM/ MATERIAL DESCRIPTION          | DESIGN ASSESSMENT  | DESIGN NON-COMPLIANCES AND ENGINEERING JUDGEMENTS | DESIGN COMPLIANCES         |
|--------|---------------------------------------|--|---|----------------------------|
| 01     | BASE WALL / PRIMARY SUBSTRATE         | 1. Concrete<br>2. Block work<br>3. Metal framing<br>4. Gypsum Board<br>5. Others | 1.<br>2.<br>3.<br>4.<br>5.                        | 1.<br>2.<br>3.<br>4.<br>5. |
| 02     | BASE WALL / PRIMARY SUBSTRATE COATING | 1. System Listing<br>2.<br>3.  | 1.<br>2.<br>3.                                    | 1.<br>2.<br>3.             |
| 03     | CURTAINWALL                           | 1. System Listing<br>2. Spandrel dimension<br>3.                                 | 1.<br>2.<br>3.                                    | 1.<br>2.<br>3.             |
| 04     | CLADDING PANELS                       | 1. System Listing<br>2. Product Listing<br>3. CoC                                | 1.<br>2.<br>3.                                    | 1.<br>2.<br>3.             |
| 05     | GLAZING                               | 1. System Listing<br>2. CoC<br>3.  |   |                            |
| 06     | INSULATION MATERIAL                   | 1. System Listing<br>2. CoC<br>3.  | 1.<br>2.<br>3.                                    | 1.<br>2.<br>3.             |
| 07     | CAVITY BARRIER                        | 1. System Listing<br>2. Cavity width<br>3.                                       | 1.<br>2.<br>3.                                    | 1.<br>2.<br>3.             |
| 08     | FIRESTOPPING SYSTEM                   | 1. System Listing<br>2.<br>3.  | 1.<br>2.<br>3.                                    | 1.<br>2.<br>3.             |
| 09     | VAPOUR/ MOISTURE BARRIER              | 1. System Listing<br>2.<br>3.  | 1.<br>2.<br>3.                                    | 1.<br>2.<br>3.             |
| 10     | GASKETS                               | 1. System Listing  | 1.  | 1.                         |
| 11     | BACKER ROD                            | 1. System Listing  | 1.  | 1.                         |
| 12     | EPDM PRODUCTS                         | 1. System Listing  | 1.  | 1.                         |
| 13     | SEALANTS                              | 1. System Listing  | 1.  | 1.                         |

Format A2.9.13.: Technical Assessment

## A2. Drawing Submission Requirements

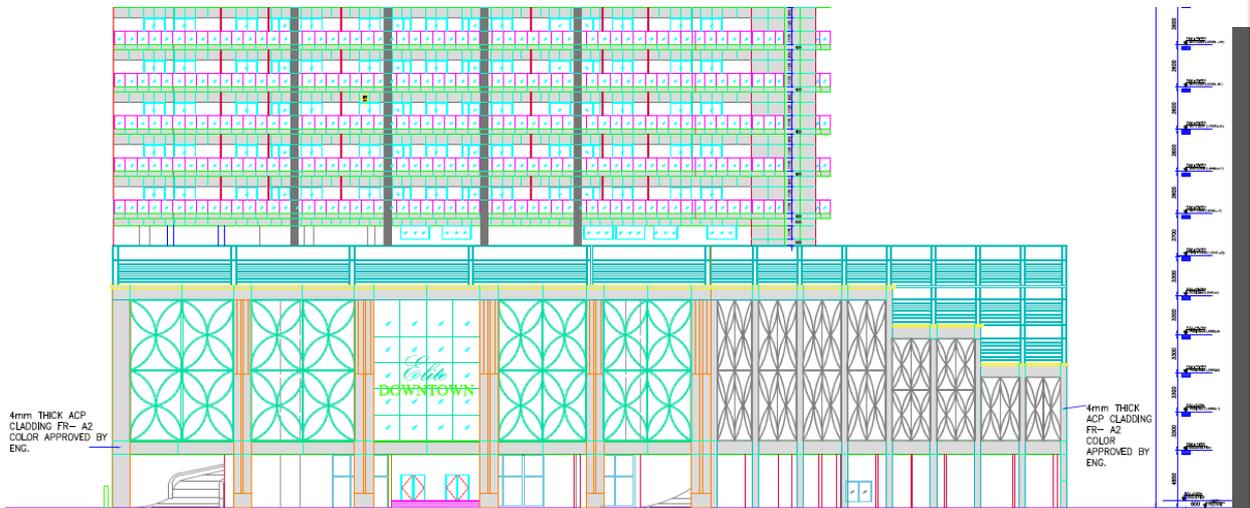
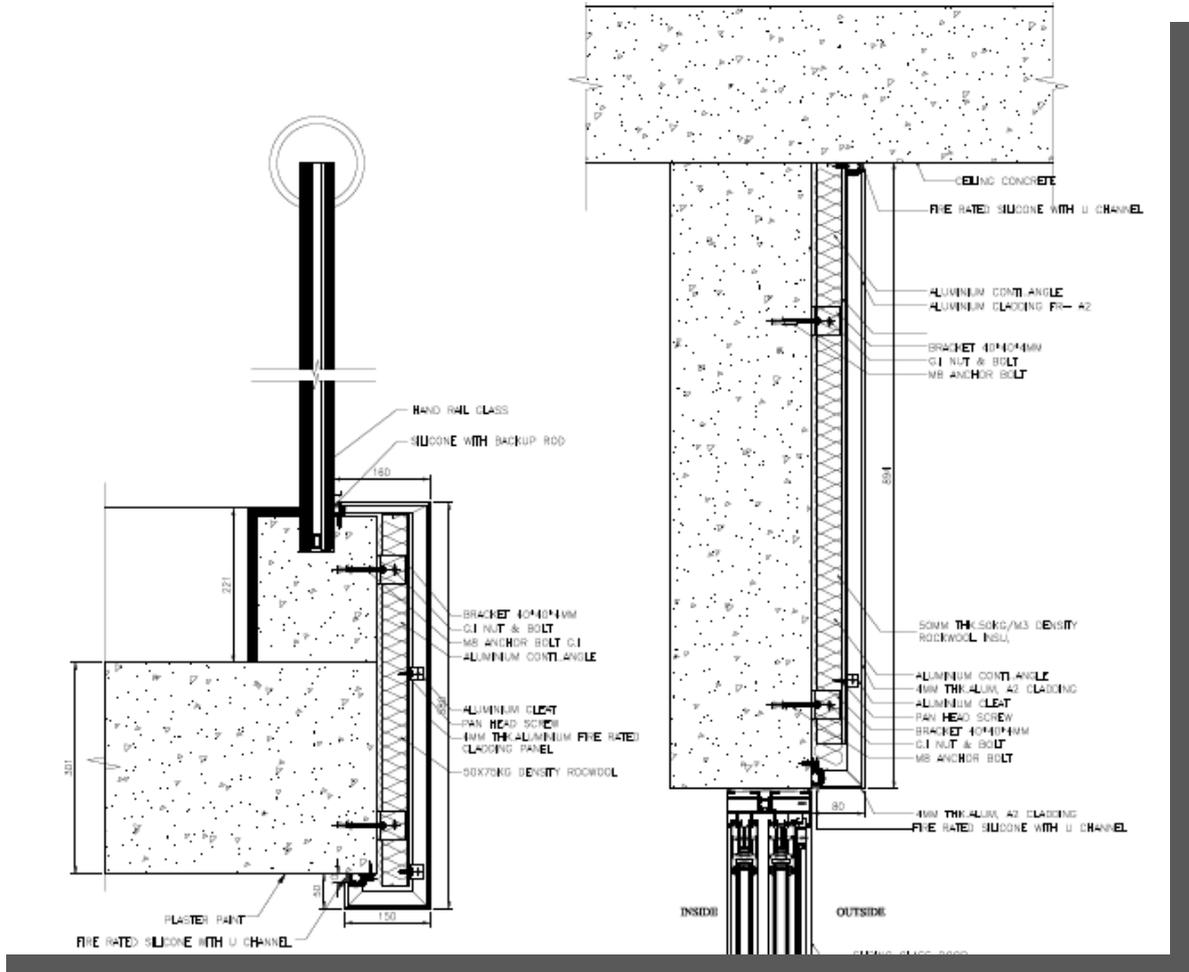
### A2.9. Façade, Cladding, Curtainwall and Roofing proposal submissions



Format A2.9.14.: Schematics (In colour)

## A2. Drawing Submission Requirements

### A2.9. Façade, Cladding, Curtainwall and Roofing proposal submissions



Format A2.9.14.: Schematics (In colour)

## A2. Drawing Submission Requirements

### A2.9. Façade, Cladding, Curtainwall and Roofing proposal submissions

#### INSPECTION REPORT

Date:

Report Reference number:

Project:

Percentage of building construction status:

Plot No.:

House of Expertise:

Inspectors Names and Signatures:

| S. No. | SYSTEM/ DESCRIPTION                   | MATERIAL | INSPECTION REPORT   | COMPLIANCE OR DEVIATION REMARKS | DIGITAL EVIDENCE  |
|--------|---------------------------------------|----------|---|---------------------------------|---|
| 01     | BASE WALL / PRIMARY SUBSTRATE         |          | 1. Concrete<br>2. Blockwork<br>3. Metal framing<br>4. Gypsum Board<br>5. Others | 1.<br>2.<br>3.<br>4.<br>5.      |   |
| 02     | BASE WALL / PRIMARY SUBSTRATE COATING |          | 1.<br>2.  | 1.<br>2.                        |   |
| 03     | CURTAINWALL                           |          | 1. Spandrel compliance<br>2.<br>3.  | 1.<br>2.<br>3.                  |   |
| 04     | CLADDING PANELS                       |          | 1.<br>2.  | 1.<br>2.                        |   |
| 05     | GLAZING                               |          | 1.<br>2.  |                                 |   |
| 06     | INSULATION MATERIAL                   |          | 1.<br>2.<br>3.  | 1.<br>2.<br>3.                  |  |
| 07     | CAVITY BARRIER                        |          | 1.<br>2.  | 1.<br>2.                        |   |
| 08     | FIRESTOPPING SYSTEM                   |          | 1.<br>2.  | 1.<br>2.                        |   |
| 09     | VAPOUR/ MOSITURE BARRIER              |          | 1.<br>2.  | 1.<br>2.                        |   |
| 10     | GASKETS                               |          | 1.  | 1.                              |   |
| 11     | BACKER ROD                            |          | 1.  | 1.                              |   |
| 12     | EPDM PRODUCTS                         |          | 1.  | 1.                              |   |
| 13     | SEALANTS                              |          | 1.  | 1.                              |   |

Format A2.9.15.: Inspection Report