

ANNEXURE. A.1.21. Rev 2.

A.1.21. Rev 2. FIRE STOPPING, EXTERIOR WALL CLADDING/CURTAINWALL AND ROOFING SYSTEMS

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ANNEXURE. A.1.21. Rev 2

A.1.21. Rev 2. FIRE STOPPING, EXTERIOR WALL CLADDING AND ROOFING SYSTEMS

1. GENERAL

- 1.1.** Annexure A.1.21. Rev 2. Denotes the revisions in UAE Fire and Life Safety Code of Practice where A is Annexure, 1 is the Chapter Number and 21 is section of that chapter in UAE Fire and Life Safety Code of Practice. Rev 2 is the second revision.
- 1.2.** The provision of this annexure shall specify the requirements for the Classification, Design, Material requirements, Installation, Inspection, Maintenance and Management of Firestopping Systems, Curtainwall Systems, Glass and Glazing, Cladding Systems, Roofing Systems and Interior Finishes.
- 1.3.** If any conflicts of requirements arise between UAE Fire and Life Safety Code of Practice and its Annexures, the Annexure requirements shall supersede on all other requirements.
- 1.4.** The requirements of this annexure are applicable to all new constructions approved by Civil Defence on or after 1st September 2012 and all under construction buildings where cladding/ fire stopping/curtainwall installation has not commenced as on 1st April 2013.
- 1.5.** For the buildings that are existing and have Cladding/Curtainwall systems on the building envelope, it is highly recommended to the Building Owner to have the perimeter wall evaluated through Civil Defence approved House of Expertise and resolve non-compliances through alternative solutions.
- 1.6.** Test standards prescribed in this annexure are essentially to evaluate the Fire Propagation, Fire rating, Fire resistance and Flame spread characteristics. Where structural, environmental, seismic performance of these materials and assemblies is desired by other approval authorities and departments, relevant latest test standards and approvals shall be followed along with the tests and approvals prescribed in this annexure to address the structural, environmental, seismic performance of these materials and assemblies.

2. DEFINITIONS

2.1. Firestopping

It is a general term for a passive fire protection system of various materials and components that are used to seal openings and joints in fire resistive wall and/or floor assemblies in a way that will preserve the full fire resistance rating of the assembly.

2.2. Firestop System

The use of a specific Firestop material or combination of materials around a specific penetrant(s) or into a specific joint in conjunction with a specific wall and/or floor construction type.

2.3. Barrier

Any bearing or non-bearing wall or floor that has an hourly fire and smoke rating.

2.4. Through-penetration

The term is used to denote an opening in a fire rated wall or floor through which passes a mechanical, electrical, piping, structural, communication or other device.

2.5. Membrane-penetration

Any penetration in a fire-rated wall that breaches only one side of the barrier.

2.6. Fire Resistive Joint

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.

2.7. Perimeter Barrier

Any gap, joint, or opening, whether static or dynamic, between a fire-rated floor assembly and a rated and/or non-rated exterior wall assembly. A single or combination of materials are used to create a firestop assembly at the perimeter gap between a fire resistance rated floor assembly and a non-rated wall assembly, capable of preventing the spread of heat, fire, gases, smoke or other defined hazards through the opening in the wall and floor assembly.

2.8. Curtain-wall

A non-load-bearing external wall attached to a framed structure. It's usually a glass and metal profile exterior wall assembly with all the associated accessories to provide an aesthetic exterior building envelope.

2.9. Dynamic Joint

The linear opening or gap between adjacent fire resistant structures designed to allow independent movement of a building. A joint is designed into structures to accommodate movement in any plane caused by thermal, wind, seismic or other loading forces.

2.10. Static Joint

The linear opening or gap between adjacent fire resistant structures that would accommodate movement of a building.

2.11. 'F' Rating

The time, stated in hours, that a Firestop system will prevent the passage of flame through an opening and not permit the projection of a water stream through a fire rated assembly. Firestop systems and devices shall have an F rating of at least 1 hour, but not less than the required fire resistance rating of the fire barrier penetrated, as determined by NFPA 251, ASTM E-814, UL 1479, UL 2079, FM 4990, BS EN1366-3 or other equivalent standards.

2.12. 'T' Rating

The period of time (in hours or 15 minute increments) a Firestop system has been shown capable of keeping the unexposed surface of the Firestop system and/or any penetrating items from exceeding a 325 °F (163 °C) temperature rise. This T rating also includes passage of F rating requirements for the same time period as determined by ASTM E 814, ASTM E-119, UL 1479, FM 4990, BS EN1366-3 or other equivalent standards.

2.13. 'L' Rating

The amount of air leakage through the fire rated assembly, determined by applying specified air pressure (0.30" water column) across the surface of the test assembly. The rating is expressed in cubic feet per minute (CFM) leakage per square foot of opening, as detailed in UL 1479, UL 2079, BS EN1366-3 or equivalent standards. An L rating is a measure of the ability of a fire-resistive assembly to prevent cold and warm smoke

passage through fire stops, joint seals and other resistance rated assemblies, obtained at ambient or elevated temperatures.

2.14. Cladding

Cladding, other than thermal barrier and Sandwich Panels (**See 2.18 for thermal Barrier and 2.37 for Sandwich Panel**), is a non-structural covering installed over structural surfaces. It is usually in Metal Composite Materials (MCM) but it is also available in a variety of building materials and made to tolerate extreme weather conditions.

2.15. MCM (Metal Composite Material, including ACP, Aluminium Composite Panels)

A factory manufactured panel consisting of metal skins bonded to both faces of a “core” (See 2.36 for Core definition and See 2.37 for Sandwich panel definition). All MCM’s shall be tested and approved at the maximum thickness intended for use and intended assemblies. However, MCM’s including 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 exterior walls.

(See section 4.2.4. and 4.3.4 for the required test standards and details)

2.16. EIFS (Exterior Insulation and Finish Systems) /ETICS (External Thermal Insulation Composite Systems)

Exterior insulation and finish systems (EIFS) are materials, assemblies used in exterior walls as non-load-bearing barrier walls and exterior cladding systems. EIFS shall be specified and installed in accordance with section 4.5.

2.17. Roof Assemblies

The roof assemblies are component(s) above the roof structural framing, including the roof deck, vapor barrier, insulation, roof cover, coatings or toppings, or any combination and assemblies. Roof assemblies shall be tested according to both interior and external fire tests. See section 5 for required test standards and details.

2.18. Thermal Barrier.

Insulation materials and components are separated from the interior of a building and from plenums by thermal barrier, which limits the average temperature rise of an unexposed surface to not more than 250°F (139°C) for a specified fire exposure complying with the standard time-temperature curve of NFPA 251, NFPA 286, UL 1715, FM 4880, UL 1040 or equivalent tests.

2.19. Foam Plastic Insulation (Used as core in Materials other than MCM)

A cellular plastic, used for thermal insulating or acoustical applications, having a density of 20 lb/ft³ (320 kg/m³) or less, containing open or closed cells, and formed by a foaming agent. Foam plastic insulation or foam plastic cores of manufactured assemblies and components, other than MCM's, shall be tested and approved at the minimum and maximum thickness intended for use and shall comply with any of the following.

- i. Class A when tested to NFPA 255 or ASTM E84 or UL 723
- ii. Class 0 when tested to BS 476 Part 6 and 7
- iii. Class B1 when tested to DIN 4102
- iv. Class B-s2, d0 when tested to EN 13501-1

The foam plastic insulation wherever used shall be separated from the building interior by thermal barrier.

2.20. Glass and Glazing

Glass or transparent or translucent plastic sheet used in windows, doors, Skylights, or curtain walls, roofs and other safety purposes, shall pass the test requirements of CPSC 16 (U.S. Consumer Product Safety Commission) CFR 1201, Safety Standard for Architectural Glazing Materials, ANSI Z97.1 or equivalent tests.

2.21. NFPA 255 or ASTM E 84 or UL 723 – Flame Spread Classification - Class I or Class A

In accordance with NFPA 255, ASTM E 84 or UL 723, Class I or Class A finishes shall be those finishes with a flame spread of 0–25 and smoke development of 0–450 and shall include any material classified at 25 or less on the flame spread test scale and 450 or less on the smoke test scale. Any element thereof, when so tested, shall not continue to propagate fire.

2.22. NFPA 255 or ASTM E 84 or UL 723 - Flame Spread Classification - Class II or Class B

In accordance with NFPA 255, ASTM E 84 or UL 723, Class II or Class B finishes shall be those finishes with a flame spread of 26–75 and smoke development of 0–450 and shall include any material classified at more than 25 but not more than 75 on the flame spread test scale and 450 or less on the smoke test scale.

2.23. NFPA 255 or ASTM E 84 or UL 723 - Flame Spread Classification - Class III or Class C

In accordance with NFPA 255, ASTM E 84 or UL 723, Class III or Class C Interior Wall and Ceiling Finish. Class C interior wall and ceiling finishes shall be those finishes with a flame spread of 76–200 and smoke development of 0–450 and shall include any

material classified at more than 75 but not more than 200 on the flame spread test scale and 450 or less on the smoke test scale.

2.24. BS Flame Spread Classification - Class 1 and Class 0

A Class 1 classification is assigned by testing in accordance with BS 476: Part 7. This specifies a method of test for measuring the lateral spread of flame along the surface of a specimen of a product orientated in the vertical position. A Class 1 classification is the best of four performance levels defined within the Standard.

A Class 0 classification is assigned to Class 1 products which have a fire propagation index (I) of not more than 12 and a sub-index (i1) of not more than 6 when tested in accordance with BS 476: Part 6.

2.25. EN/DIN Combustibility and Flame Spread Classification – Class B or B1

- i. Class B1 according to DIN 4102
- ii. Class B-s1, d0 or B-s2, d0 according to EN 13501-1,

The materials tested to these standards are difficult to ignite and fire must extinguish itself when source of the fire is removed. They include materials such as wood treated with fire retardant and some rigid foam plastics.

2.26. EN/DIN Combustibility and Flame Spread Classification – Class A2

- i. Class A2 as per DIN 4102
- ii. Class A2-s2, d0 as per EN 13501-1

These materials are non-combustible with combustible organic components. This category includes materials like gypsum plasterboards (with sealed surface), polystyrene concrete and mineral wool. Under conditions of fully developed fire, these products will not contribute to fire load and fire growth.

2.27. Non-Combustible Material

A material that, in the form in which it is used and under the conditions anticipated will not ignite, burn, support combustion or release flammable vapors, when subjected to fire or heat. Materials that are reported as passing any of the following tests shall be considered noncombustible materials.

- i. ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C.
- ii. BS 476 part 4:1970 Non-Combustibility test for materials.
- iii. BS EN 13501-1:2002, Class A1, Fire classification of construction products and building elements.
- iv. FM 4880 or FM 4470, Non-combustible core rating

2.28. Combustible Material

A material that, in the form in which it is used and under the conditions anticipated, will ignite and burn. Or it is material that does not meet the definition of noncombustible or limited-combustible as mentioned in section 2.27.

2.29. Tested and Listed Materials

Refers to materials, devices or components that have been tested by an accredited testing laboratory after which the test results are **certified** and published by an **accredited certification and conformity assessment body or quality assurance agency**. Such materials, devices or components shall bear a **certification and Listing Label**.

2.30. Tested and Listed Systems/Assemblies

Refers to arrangement, compilation, assembly or method of installation of devices or components that have been tested by an accredited testing laboratory as the intended arrangement, compilation, assembly or method of installation, after which the test results are **certified** and published by an **accredited certification and conformity assessment body or quality assurance agency**. Such arrangement, compilation, assembly or method of installation shall bear a **certification and Listing Label**.

2.31. Equivalent tests

Equivalent tests refer to the Test Standards which are not mentioned in this document, which might arise in future and are considered equivalent in their application, test methods and specifications. This equivalence shall be proved through 'technical specifications comparison document' from the Testing Laboratory and certification bodies making the equivalent claim.

2.32. Engineering Judgments (EJ's)

An evaluation of the field conditions which do not conform to or deviate from an existing tested and listed assemblies. Engineering Judgment shall be issued essentially by the original testing laboratory that listed the system or registered Fire Consultant, Fire Protection Engineer, or an independent certification agency that provides certification services for such systems. EJ's are not to be used as a substitute for a classified system if it exists. EJ's, when considered, shall be approved by Civil Defence.

2.33. Low rise buildings

The occupancies or Multiple and Mixed occupancies, facilities, buildings and structures having occupiable or usable floors at or up to 15 Meters from the lowest grade or lowest level of Fire Service Access into that occupancy is categorized as Lowrise Building.

2.34. Midrise buildings

The occupancies or Multiple and Mixed occupancies, facilities, buildings and structures having occupiable or usable floors between 15 Meters to 23 Meters from the lowest grade or lowest level of Fire Service Access into that occupancy is categorized as Midrise Building.

2.35. High rise buildings

The occupancies or Multiple and Mixed occupancies, facilities, buildings and structures having occupiable or usable floors more than 23 Meters above the lowest grade or lowest level of Fire Service Access into that occupancy is categorized as Highrise Building.

2.36. MCM and ACP Core

Core used in factory manufactured MCM can be of plastic or mineral or any such material other than foam plastic insulation, having flame and smoke spread characteristics as mentioned in sections 4.2.4 and 4.3.4.

2.37. Sandwich Panels (Self-supporting double skin metal faced insulating panels)

Also referred to as Composite or Insulated panels, comprise of internal and external metal sheets having an insulation core. The high level of insulation is critical to saving energy and the associated carbon emissions from buildings. These panels installed as Interior/External Walls/Roofing, including applications such as storage sheds, cold storages, freezers, as basement covering, kiosks etc shall be tested either as a product or as a system as appropriate as described in Sections 4.2.5, 4.2.6, 4.3.5, 4.3.6, 5.2.1 & 5.3.1.

3. FIRE STOPPING SYSTEMS (PASSIVE PROTECTION SYSTEMS) SYSTEMS

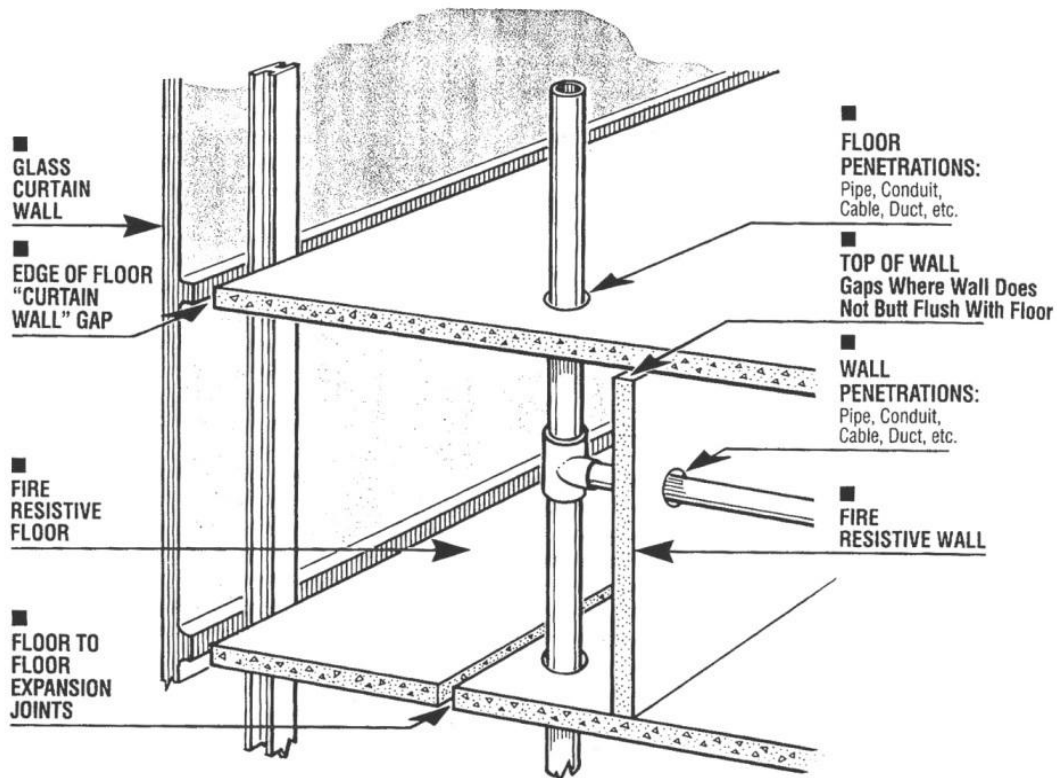
3.1. General

3.1.1. The Classification, Design, Installation, Inspection, Maintenance and Management of Firestop Systems to achieve required Fire-resistance-rated Construction and Compartmentalization shall be as per this section.

3.1.2. Firestop systems shall 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 in accordance with the requirements of the UAE

Fire Code and Life Safety Code of Practice and other applicable International codes & standards referenced in this document.

3.1.3. Firestop systems shall be used in locations including, but not limited to, the following:



3.1.4. Penetrations through fire resistance rated floor including both empty openings and openings containing penetrants.

3.1.5. Penetrations through fire resistance rated wall assemblies including both empty openings and openings containing penetrants.

3.1.6. Membrane penetrations in fire resistance rated wall assemblies where items penetrate one side of the barrier.

3.1.7. Joints between fire resistance rated assemblies.

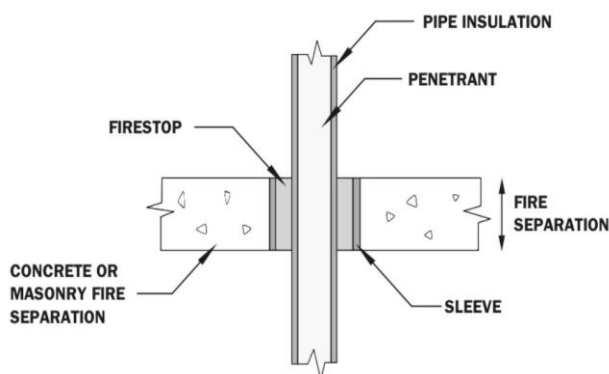
3.1.8. Perimeter gaps between rated floors/roofs and an exterior wall assembly.

- 3.1.9.** Firestopping materials shall not crack or pull back from contact surfaces such that a void is created.
- 3.1.10.** Firestopping materials shall be moisture resistant, and may not dissolve in water after curing.

3.2. Classification of Firestop systems

3.2.1. Through penetration Firestop system

- 3.2.1.1.** 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.

- 3.2.1.2.** The penetrants include, but are not limited to, mechanical, electrical, piping, structural and communication devices.
- 3.2.1.3.** Through Penetration Firestop System Ratings shall be established in accordance with ASTM E 814, UL 1479, BS EN 1366-3, FM 4990 or other equivalent tests as the test method.
- 3.2.1.4.** The firestop system refers to all the necessary components and dimensions in the approved firestop design, which can include but is not limited to the penetrant size, annular space, sealant depth and other parameters in the system listing.
- 3.2.1.5.** The rating of the firestop system shall be equivalent to the rating of the barrier in which the firestopping is installed.

3.2.2. Membrane-penetration

- 3.2.2.1.** 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.

3.2.2.2. 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.

3.2.2.3. 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. If more than one (1) membrane penetration is installed on opposite sides of fire resistance rated assembly, the vertical and/or horizontal distance separating them shall be the minimum separating distance shown in wall opening protective listing.

3.2.3. Fire resistive joint systems

3.2.3.1. 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.

3.2.3.2. 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.

3.2.3.3. The system refers to all the necessary components in the approved firestop design, which can include but is not limited to the joint width, sealant or backing material depth, and other parameters in the listing.

3.2.3.4. The rating of the firestop system shall be equivalent to the rating of the two assemblies in which the firestopping is installed.

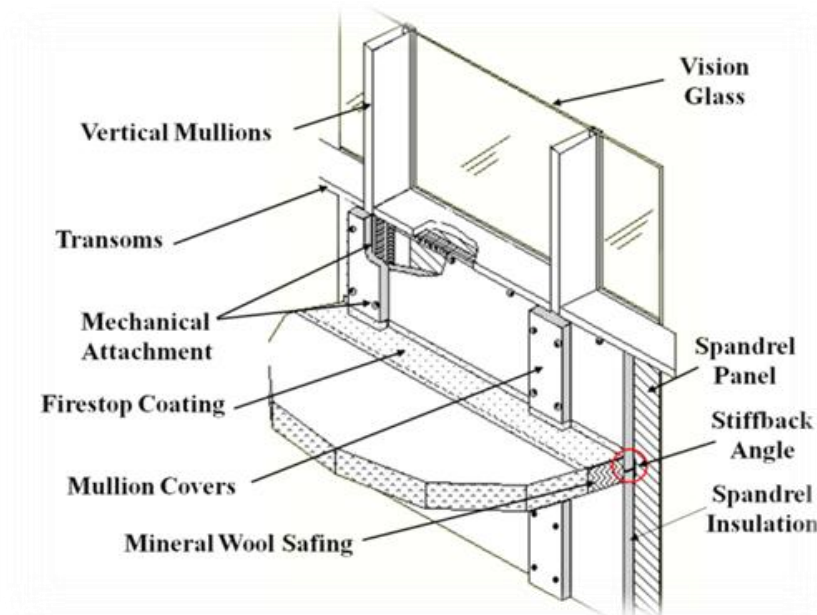
3.2.3.5. The maximum movement that a fire resistive joint system is able to accommodate, as shown in the design listing, shall be equal to or greater than the movement that is expected or specified for a given joint in construction or design documents. All joints shall be assumed to be dynamic unless specified otherwise in construction documents.

3.2.4. Perimeter fire barriers – Exterior Curtain-wall System

3.2.4.1. 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.

3.2.4.2. Exterior curtain walls and perimeter joints 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.

- 3.2.4.3. Openings in exterior walls that expose openings in the next story above shall be protected to Separate the openings with a spandrel panel not less than 36 in. (915 mm) high or a wall with a 1-hour fire resistance rating OR between the openings with a 30 in. (760 mm) horizontally projecting barrier with a 1-hour fire resistance rating.
- 3.2.4.4. 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.
- 3.2.4.5. The system refers to all the necessary components and conditions in the



approved firestop design, which can include but is not limited to the gap size, sealant or backing material depth, and other parameters in the listing.

- 3.2.4.6. The rating of the firestop system shall be equivalent to the rating of the floor in which the firestopping is installed. The components of the curtain wall and fire stopping should be such that if sections of the curtain wall are damaged or collapse, the integrity of the firestopping and its ability to provide the required fire resistance is not compromised.
- 3.2.4.7. All perimeter Fire barrier and Curtainwall systems shall be Listed Assemblies, tested and certified for the intended application.
- 3.2.4.8. Parties seeking approval for Fire stopping and Curtainwall Systems shall furnish the test certificates, approval certification numbers for the system as an assembly and not for individual components.

4. EXTERIOR WALL CLADDING SYSTEMS

4.1. General

- 4.1.1. This category addresses the Combustibility, Surface Burning and Flame spread rating required for the exterior /perimeter /façade cladding systems.
- 4.1.2. Commonly used Exterior cladding systems consist of Metal Composite Panels (such as Aluminium Composite Panels), Sandwich Panels, EIFS, ETICS, Metal Panels, Concrete based Panels i.e. GRC, Pre-cast, Clay tiles, Ceramic tiles and Glass Fibre Reinforced Panels etc.
- 4.1.3. Cladding Systems mainly consists of façade sub structure system components, accessories and insulation necessary for complete water tight, ventilated open joint, structurally stable and exterior wall panel system having Surface burning or Flame spread Classification with its intended application.
- 4.1.4. Use of silicon or fillers in between panel joints and non rated materials is not permitted unless such materials are part of the certified system.
- 4.1.5. Where a single or combination of materials are used to create a firestop assembly at the perimeter gap between a fire-rated floor assembly and wall assembly having Surface burning or Flame spread Classification, such arrangement shall be tested as an assembly and shall be certified as capable of preventing the spread of heat, fire, toxic gases, smoke or other defined hazards through the opening in the wall and floor assembly as well as the vertical propagation of flames through the external facade surface.

4.2. Exterior Wall Cladding System for Midrise Buildings, Highrise Buildings, MALL, ASSEMBLY, HOSPITAL and EDUCATIONAL buildings and Buildings' exterior wall having horizontal separation of less than 3 m from any side of the property line

- 4.2.1. This category addresses the requirements for External Cladding Systems installed on Midrise Buildings, Highrise Buildings, MALL, ASSEMBLY, HOSPITAL and EDUCATIONAL buildings and Buildings' exterior wall having horizontal separation of less than 3 m from any side of the property line. These requirements are applicable even when the External Cladding Systems on the buildings mentioned, have less than 10% of the building envelope.
- 4.2.2. Cladding Panels shall be tested and approved for their Combustibility and Flame spread classification at the minimum and maximum thickness intended for use and intended assemblies and shall not contain Foamed Plastic Insulation as its core. (see definitions 2.15 and 2.36)
- 4.2.3. External Cladding Systems installed on buildings shall not reduce/change/affect the construction classification of the building as required by Chapter 1. Construction and Compartmentalization.

- 4.2.4. Core (exposed without skin) used in Cladding Panels can be of plastic or mineral or any such material other than foam plastic insulation, having flame and smoke spread characteristics of any of the following.**
- a. **Class A when tested to NFPA 255 or ASTM E 84 or UL 723**
 - b. **Class 0 when tested to BS 476 Part 6 and 7**
 - c. **Class A2 when tested to DIN 4102**
 - d. **Class A1, d0 when tested to EN 13501-1**
 - e. **Class 1 when tested to FM 4880**
- 4.2.5. Cladding panels used in any assembly on Midrise buildings, Highrise buildings, MALL, ASSEMBLY, HOSPITAL and EDUCATIONAL buildings and buildings having separation distance of less than 3 m from any side of the property line shall comply with any of the following.**
- a. **Class A when tested to NFPA 255 or ASTM E 84 or UL 723**
 - b. **Class A2 when tested to DIN 4102**
 - c. **Class A1, d0 when tested to EN 13501-1**
- 4.2.6. All External Cladding Systems installed on Midrise buildings, High rise buildings, MALL, ASSEMBLY, HOSPITAL and EDUCATIONAL buildings and buildings having exterior wall with horizontal separation of less than 3 m from any side of the property line, when tested as an 'System Assembly' with intended panel thickness, involved core, insulation, joints, seams, fastners and wall arrangement shall be in accordance with any of the following tests**
- a. Specified performance criteria as per LPS 1582 or NFPA 285 with test results equivalent to
 - i. **Class 1 or A1 when tested to FM 4880 and FM 4881**
 - ii. **BS 8414 Parts 1 (on face of the building) or 2 (fixed to structural steel frame) as intended.**
- 4.2.7. Any cladding panels installed shall be completely separated from the building interior by a thermal barrier, unless tested as an assembly in large scale tests such as UL 1715, UL 1040, FM 4880, NFPA 286.**
- 4.2.8. The thermal barrier where required shall be part of the assembly tested in accordance with section 4.2.6.**

- 4.2.9. Thermal barrier is not required if cladding panels are installed as part of balcony envelope or similar architectural feature as exterior trim.
- 4.2.10. Parties seeking approval for Exterior Cladding Systems shall furnish the 'certificate of compliance' from approved certification bodies, approval certification numbers and system as an assembly **(As per sections 4.2.4, 4.2.5 and 4.2.6)**

4.3. Exterior Wall Cladding System for Low rise buildings, Buildings having exterior wall with horizontal separation of more than 3 m from any side of the property line and Buildings other than MALL, ASSEMBLY, HOSPITAL and EDUCATIONAL buildings

- 4.3.1. This category addresses the Exterior Wall Cladding System for Low rise buildings, Buildings having exterior wall with horizontal separation of more than 3 m from any side of the property line and Buildings other than MALL, ASSEMBLY, HOSPITAL and EDUCATIONAL buildings. These requirements are applicable even when the External Cladding Systems on the buildings mentioned, have less than 10% of the building envelope.
- 4.3.2. Cladding Panels shall be tested and approved for their Flame spread classification at the maximum thickness intended for use and intended assemblies and shall not contain Foamed Plastic Insulation as its core. **(see definitions 2.15 and 2.36)**
- 4.3.3. External Cladding Systems installed on buildings shall not reduce/change/affect the construction classification of the building as required by Chapter 1. Construction and Compartmentalization.
- 4.3.4. **Core (exposed without skin) used in Cladding Panels can be of plastic or mineral or any such material other than foam plastic insulation, having flame and smoke spread characteristics of any of the following.**
 - a. Class A when tested to NFPA 255 or ASTM E 84 or UL 723
 - b. Class 0 when tested to BS 476 Part 6 and 7
 - c. Class A2 when tested to DIN 4102
 - d. Class A1, d0 when tested to EN 13501-1
 - e. Class 1 when tested to FM 4880
- 4.3.5. **Cladding panels used in any assembly on Low rise buildings, Buildings having exterior wall with horizontal separation of more than 3 m from any side of the property line and Buildings other than MALL, ASSEMBLY, HOSPITAL and EDUCATIONAL buildings shall comply with any of the following.**

- a. **Class B or class II when tested to NFPA 255 or ASTM E 84 or UL 723**
- b. **Class B1 when tested to DIN 4102**
- c. **Class B1-s2, d0 when tested to EN 13501-1**

4.3.6. All External Cladding Systems installed on Low rise buildings and buildings having exterior wall with separation distance of more than 3 m from any side of the property line **other than MALL, ASSEMBLY, HOSPITAL and EDUCATIONAL buildings, when tested as an ‘System Assembly’ with intended panel thickness, involved core, insulation, joints, seams, fastners and wall arrangement** shall be in accordance with

- a. **Specified performance criteria as per LPS 1582 or NFPA 285 with test results equivalent to**
 - i. **Class 1 or A1 when tested to FM 4880 and 4881**
 - ii. **BS 8414 Parts 1 (on face of the building) or 2 fixed to structural steel frame) as intended.**

4.3.7. Any cladding panels installed shall be completely separated from the building interior by a thermal barrier, unless tested as an assembly in large scale tests such as UL 1715, UL 1040, FM 4880, NFPA 286.

4.3.8. The thermal barrier where required shall be part of the assembly tested in accordance with section 4.3.6.

4.3.9. Thermal barrier is not required if Cladding panels are installed as part of balcony envelope or similar architectural feature as exterior trim.

4.3.10. Parties seeking approval for Exterior Cladding Systems shall furnish the ‘certificate of compliance’ from approved certification bodies, approval certification numbers and system as an assembly **(As per sections 4.3.4, 4.3.5 and 4.3.6)**

4.4. Metal Composite Panel (MCM)/ Aluminium Composite Panel (ACP) Systems

4.4.1. Metal composite materials (MCM/ACP) other than sandwich panels used in exterior walls assembly shall be in accordance with the following section.

4.4.2. MCM 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 exterior walls.

- 4.4.3. MCM shall be permitted to be installed on the exterior of buildings classified as Type A, Type B, Type C, or Type D construction, as mentioned in Chapter 1. Compartmentalization, without changing the construction classification of the building.
- 4.4.4. MCM shall not reduce the required fire resistance rating of the exterior wall to which the MCM are attached.

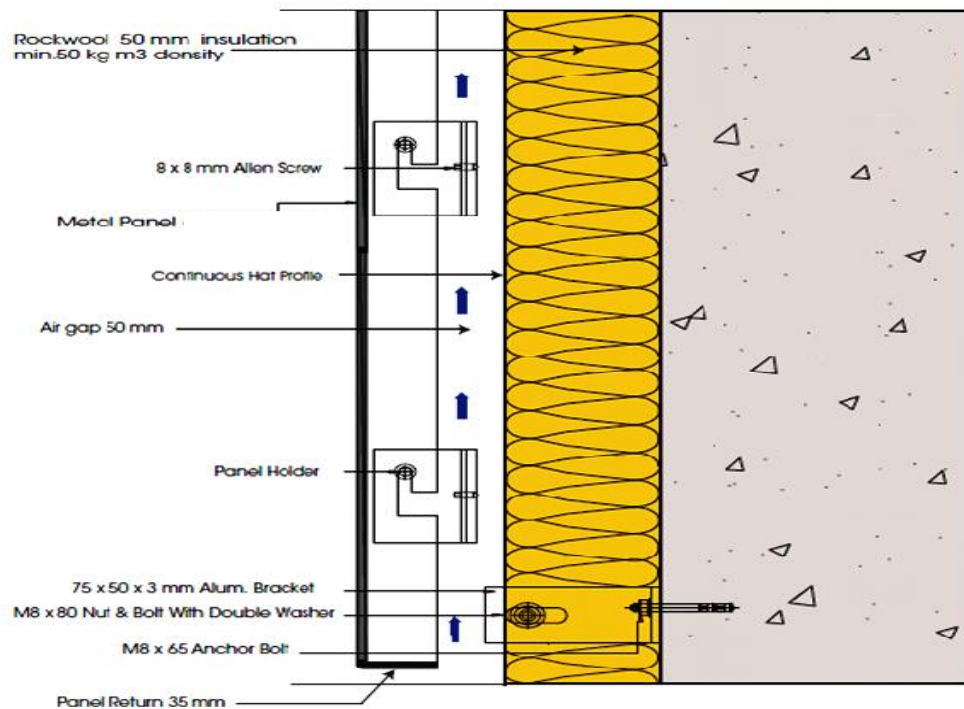
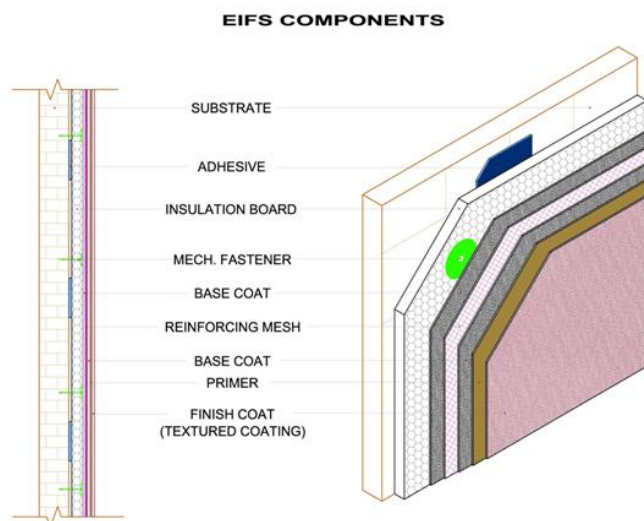


Illustration – One of the Metal Wall Panel Assembly :

- 4.4.5. MCM installed on the exterior of buildings classified as Type A, Type B, Type C, or Type D construction, as mentioned in Chapter 1. Compartmentalization, shall **comply with section 4.2. or section 4.3. depending on the nature of the buildings explained therein.**
- 4.4.6. MCM shall be tested as an assembly in the manner intended for use that shall include joints, seams, fasteners, and other construction details typical of the intended installation as mentioned in **sections 4.2 and 4.3.**
- 4.4.7. MCM/ACPs shall be Marked/labeled to verify its certification mark.

4.5. Exterior Insulation and Finish Systems (EIFS)/ External Thermal Insulation Composite System (ETICS)

- 4.5.1. Exterior Insulation and Finish Systems (EIFS) and External Thermal Insulation Composite System (ETICS) are multi-layered exterior wall systems that are used as building envelopes.
- 4.5.2. EIFS and ETICS shall be energy efficient thermal wrapping applied to the exterior surfaces of a building, finished with a long-life, decorative and protective coating system.
- 4.5.3. The use of EIFS and ETICS shall substantially reduce heating or cooling costs. Being an energy efficient system, it shall consequently help reduce green-house gas emissions.



4.5.4. EIFS and ETICS components

- 4.5.4.1. Insulation boards such as Non-flammable polystyrene insulation board specified in accordance with ASTM E 2430, which are secured to the exterior wall surface with a specially formulated adhesive and/or mechanical attachment.
- 4.5.4.2. A durable, water-resistant base coat, which is applied on top of the insulation and reinforced with fibre-glass mesh for added strength

4.5.4.3. A listed and durable finish coat which is both colorfast and crack-resistant tested as

- i. Class B or Class II as per NFPA 255 or ASTM E 84 or UL 723
- ii. Class 1 as per BS 476 part 7
- iii. Class B1 as per DIN 4102
- iv. Class B as per EN 13501-1

4.5.5. EIFS and ETICS specifications

4.5.5.1. EIFS and ETICS shall be specified in accordance with ANSI / EIMA 99-A 'Exterior Insulation & Finish Systems'

4.5.5.2. EIFS and ETICS installed in accordance ASTM 1397 'Standard Practice for Application of Class PB Exterior Insulation and Finish Systems' or equivalent.

4.5.5.3. EIFS and ETICS shall meet the performance requirements as per ETAG 004 'Guidelines for European Technical Approval of External Thermal Insulation Composite Systems (ETICS) with Rendering'.

4.5.6. EIFS and ETICS Acceptance

4.5.6.1. EIFS and ETICS installed as Exterior Wall Cladding System for Midrise Buildings, Highrise Buildings, MALL, ASSEMBLY, HOSPITAL and EDUCATIONAL buildings and Buildings' exterior wall having horizontal separation of less than 3 m from any side of the property line, when tested as an 'System Assembly' with intended panel thickness, involved core, insulation, joints, seams, fasteners and wall arrangement shall be in accordance with any of the following tests.

- a. Specified performance criteria as per LPS 1582 or NFPA 285 with test results equivalent to
 - i. **Class 1 or A1 when tested to FM 4880 and FM 4881**
 - ii. **Class A2 when tested as per EN 13501-1 or ISO 9705**

- iii. **BS 8414 Parts 1 (on face of the building) or 2 (fixed to structural steel frame) as intended.**

4.5.6.2. EIFS and ETICS Systems installed on Low rise buildings and buildings having exterior wall with separation distance of more than 3 m from any side of the property line other than MALL, ASSEMBLY, HOSPITAL and EDUCATIONAL buildings, when tested as an 'System Assembly' with intended panel thickness, involved core, insulation, joints, seams, fasteners and wall arrangement shall be in accordance with

- a. Specified performance criteria as per LPS 1582 or NFPA 285 with test results equivalent to
 - i. **Class 1 or A1 when tested to FM 4880 and FM 4881**
 - ii. **Class B1-s2, d0 when tested to EN 13501-1**
 - iii. **BS 8414 Parts 1 (on face of the building) or 2 fixed to structural steel frame) as intended.**

4.6. Glazing Systems

- 4.6.1.** The Classification, Design, Installation, Inspection, Maintenance and Management of Glass and Glazing used on exterior walls shall be as per this section.
- 4.6.2.** Buildings shall be designed and constructed to provide reasonable safety from occupants coming in contact with glazing or similar frangible construction materials during normal use of the building.
- 4.6.3.** The requirements of this section are applicable to all glazing except decorative glasses, curved glass panels, glass block panels and mirrors that are not installed as safety features, protective features or in the means of egress.
- 4.6.4.** All safety Glazing shall bear the labels from the manufacturer of safety standard it complies with.
- 4.6.5. Testing and Classification of Glazing.**

4.6.5.1. Glazing shall pass any of the following test requirements of

- a. CPSC 16 CFR 1201, Safety Standard for Architectural Glazing Materials.
- b. NFPA 251, Standard Methods of Tests of Fire Resistance of Building Construction and Materials.
- c. BS 5357 or BS EN 357
- d. BS EN 1364-3 Fire resistance tests for non-load bearing elements, Curtainwalling, Full configuration.
- e. BS EN 1364-4 Fire resistance tests for non-load bearing elements, Curtainwalling, Part configuration.
- f. All Glazing having more than 9 Sq ft (0.84 Sqm) of exposed surface area of one side of one light shall have a minimum classification category of II of CPSC 16 CFR 1201.

4.6.6. Glass in Handrails and Guards.

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

- a. Single fully tempered glass
- b. Laminated fully tempered glass
- c. Laminated heat-strengthened glass

4.6.6.2. Glazing in railing in-fill panels shall meet the following requirements.

- a. Glazing in railing in-fill panels shall be of an approved safety glazing material
- b. For all glazing types, the minimum nominal thickness shall be ¼ in. (6.4 mm)
- c. Fully tempered glass and laminated glass shall comply with Category II of CPSC 16 CFR 1201.

4.6.6.3. 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 safety factor of 4 shall be used.

4.6.6.4. 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 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.

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

5. ROOFING (ROOF ASSEMBLIES AND ROOFTOP STRUCTURES) SYSTEMS

5.1. General

- 5.1.1.** The Classification, Design, Installation, Inspection, Maintenance and Management of Roof Assemblies and Rooftop structures to achieve required roof Fire-performance shall be as per this section. Whereas the Fire rating requirements of Masonry, Concrete or Steel structure frame for the roofing shall be as per Construction classification and fire rating requirements of Table 1.6, Chapter 1. Construction and Compartmentalization, UAE Fire and Life Safety Code of Practice.
- 5.1.2.** This category addresses the requirements for Roof Assemblies and Rooftop structures on Buildings protected with automatic sprinkler system, buildings not protected with automatic sprinkler systems and buildings with horizontally projected roof assemblies which are less than 3 m from any side of the property line.
- 5.1.3.** All Roof Assemblies and Rooftop structures shall be tested and approved for their Fire Rating and Flame spread classification for their roof deck,

vapor barrier, insulation, roof cover, coatings, toppings and such combinations and certified as intended assemblies.

- 5.1.4.** Only Private Villas, Commercial Villas and Agricultural buildings are exempted from having fire rated/ listed roof assemblies or rooftop structures.
- 5.1.5.** 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
- 5.1.6.** 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 individual components.

5.2. Roofing System for Buildings protected fully with Automatic Sprinkler System

- 5.2.1.** Roof assemblies for all buildings protected fully with automatic sprinkler system when tested as an assembly shall have any of the following
 - a.** Class A or Class I rating when tested as per NFPA 256 or ASTM E 108
 - b.** Class AA to BS 476-3:2004 or Class B_{roof} T4 to EN 13501-5:2005+A1:2009
 - c.** UL 790 approval
 - d.** Class 1 rating when tested as per FM 4470 or FM 4471 or NFPA 276

5.3. Roofing System for Buildings without Automatic Sprinkler System and buildings having Roofing assemblies horizontally projected to less than 3 m from any side of the property line

- 5.3.1.** Roof assemblies for all buildings not protected fully with automatic sprinkler system and buildings having roof assemblies projecting horizontally within less than 3 m from property line, when tested as an assembly shall have a minimum of 1 hour fire rating. Moreover, when tested as an assembly shall have approvals as per any of the following.
 - a.** FM 4471 or NFPA 276
 - b.** FM 4470

- c. UL 1256
- d. 1 hour fire rated when tested to EN 1365:2 or other equivalent tests.

5.4. Light-Transmitting Plastic Skylight Glazing

5.4.1. Light-transmitting plastic roof panels, sloped glazing, and skylights shall be permitted in roof construction, provided that all of the following requirements are met:

- a. Openings through the roof are not required to be protected.
- b. The panels are located a minimum of 25 ft (7620 mm) from fire walls.
- c. The panels are located a minimum of 6 ft (1830 mm) from exterior walls that are required to be fire barrier walls.

5.4.2. Skylights and other penetrations through a fire resistance-rated roof deck shall be permitted to be unprotected, provided that the structural integrity of the fire resistance-rated roof construction is maintained and allowed by the test certification. Otherwise unprotected skylights shall not be permitted in roof construction required to be fire resistance rated.

5.4.3. Buildings without an automatic sprinkler or when the building is not equipped with smoke and heat vents, each skylight shall have a maximum area within the curb of 100 ft² (9 m²).

5.4.4. Light-Transmitting Plastic Skylight Glazing Specification

5.4.4.1. Plastics used for exterior veneer and light-transmitting applications shall meet all of the following criteria.

- a. They shall have a self-ignition temperature of 650°F (343°C) or greater when tested in accordance with ASTM D 1929.
- b. They shall have a smoke developed index not greater than 450 when tested in the manner intended for use in accordance with ASTM E 84 or UL 723, or not greater than 75 when tested in the thickness intended for use in accordance with ASTM D 2843, Standard Test for Density of Smoke from the Burning or Decomposition of Plastics.
- c. They shall meet the criteria of one of the following classifications:
 - i. CC1 — Plastic materials that have a burn length of 1 in. (25 mm) or less and flame extinguishment when tested at a

nominal thickness of 0.060 in. (1.5 mm), or in the thickness intended for use, in accordance with ASTM D 635, *Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position*

- ii. CC2 — Plastic materials that have a burning rate of 2½ in./min (64 mm/min) or less when tested at a nominal thickness of 0.060 in. (1.5 mm), or at a thickness intended for use, in accordance with ASTM D 635.

5.4.4.2. The aggregate area of skylights shall be as follows

- a. Where CC1 plastics are used, the aggregate area of skylights shall not exceed 33 percent of the floor area of the room or space sheltered by the roof in which the skylights are installed.
- b. Where CC2 plastics are used, the aggregate area of skylights shall not exceed 25 percent of the floor area of the room or space sheltered by the roof in which the skylights are installed.
- c. The aggregate area limitations shall be permitted to be increased 100 percent where the building is equipped throughout with an automatic sprinkler system or where the building is equipped with smoke and heat vents.

6. DESIGN, SELECTION AND INSTALLATION OF SYSTEMS

6.1. General

- 6.1.1. This section is general and shall apply to all the systems mentioned in section 3, 4 and 5 (Firestopping, Curtainwall, Cladding, EIFS, Roofing and Glazing Systems).

6.2. Products

- 6.2.1. All the products, as part of any of the system (Firestop, Curtainwall, Cladding, EIFS, Roofing and Glazing), shall bear design listing, Test Certifications, Manufacturer's code, System certification number and approval label conforming the individual component is part of the Total certified system.

- 6.2.2.** Accessories – Fill material components for each system shall be specified by the product manufacturer as part of their design listed system. Accessories include, but are not limited to;
- a.** Permanent forming/damming/backing materials i.e. Mineral-wool Insulation, Foams, Sealants, Fire-rated Boards, PU Backer Rods etc.
 - b.** Temporary forming materials
 - c.** Substrate primers
 - d.** Steel and Aluminum accessories
 - e.** Substructure system for metal panels as per manufacturer’s recommendation and warranty.
- 6.2.3.** Components of each system assembly shall be designed, tested, listed and approved and certified according to the standards referenced in this annexure.

6.3. Submittal

- 6.3.1.** Product manufacturer/supplier shall provide a formal submittal to the installer that will consist of
- 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.
 - c.** Engineering Judgment (EJ) – Where there is deviation from a listed and certified system, on site, for a particular configuration, the manufacturer will provide a site specific EJ.
 - 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.

6.4. Quality assurance

- 6.4.1. Single Source Limitations: Firestopping, Curtainwall, Cladding, EIFS, Roofing and Glazing systems, for each kind of classified assembly, shall be obtained from a single manufacturer, where possible.
- 6.4.2. Materials from different system manufacturers shall not be combined in an installation.
- 6.4.3. Installed systems shall be flexible to allow movement as required by the system assembly and construction conditions. The system manufacturer shall sign off on the typical installation details (as furnished by the system listing or certification bodies) handed over to the contractor.
- 6.4.4. Civil defence approved House of Expertise shall sign off on the installation of the system along with undertaking from the installer and ensuring that the installation has been carried out in accordance with the specifications of the system certification as “UNIT RESPONSIBILITY DECLARATION” and submit to both Civil Defence and the Owner.

6.5. Delivery, Storage, and Handling

- 6.5.1. 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.
- 6.5.2. 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.
- 6.5.3. All materials shall be installed prior to expiration of shelf life.

6.6. Site Examination & preparation

- 6.6.1. In Firestopping installations, general conditions of substrates, opening configurations, penetrating items, joint gaps, and other conditions affecting performance shall be thoroughly examined. 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.
- 6.6.2. Installation of systems shall commence only after unsatisfactory conditions have been corrected.
- 6.6.3. The installer of any system shall ensure that installation of system assembly is carried out strictly as per manufacturer’s installation instructions and provide evidence of Manufacturer approval on the installation drawings.

6.7. Project conditions (environmental limitations)

- 6.7.1. Systems shall be installed when ambient or substrate temperatures are within limits as per manufacturer's written instructions.
- 6.7.2. In Firestopping installations, 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.
- 6.7.3. Ventilation shall be as per the manufacturer's Material Safety Data Sheet.

6.8. Installation

- 6.8.1. For installation of all the systems, installer shall strictly follow design listed and certified systems including illustrations therein and manufacturer's installation instruction.

6.9. Installer qualification

- 6.9.1. Installer shall be certified. No installer without Civil Defence license shall work on the site. To be certified, the installer shall be licensed by Civil Defence. The Civil Defence license is based on the training and certification by the fire stopping manufacturer as having been provided the necessary training to install manufacturer's products as per specified listed system requirements.
- 6.9.2. The Civil Defence license can also be obtained if the installer is certified by third party accredited certification body such as UL, FM & LPCB etc., clarifying the specific products they are certified to install.
- 6.9.3. Installer shall strictly follow certified listed system including illustrations, installation drawings therein and manufacturer's installation instructions, fixing and finishing instructions.

6.10. Coordination

- 6.10.1. Coordinate preparation and installation of the systems with all trades and sub-trades to ensure that opening shapes and sizes, penetrating item placement, and angle relative to the opening are such that the requirements for Engineering Judgments is kept to a bare minimum and hence system assemblies are installed according to specified requirements.
- 6.10.2. In Firestopping installations, schedule firestopping after installation of penetrants but prior to concealing the openings and joints.

6.10.3. Firestopping, curtainwall, EIFS and cladding installations shall not be concealed from view until the inspection agency or Authorities Having Jurisdiction have inspected and approve each installation.

6.11. Identification

6.11.1. In Firestopping installations, identify installed firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

- a. The words "**Warning – Through-Penetration Firestop System--Do Not Disturb. Notify Building Management of Any Damage.**"
- b. Firestop product name with system listing number.
- c. Name and address of Manufacturer, Installer and Inspection Agency.
- d. Installation date.

6.11.2. 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.

6.12. Inspection

6.12.1. In Firestopping installations, inspection of through penetration firestop systems through fire rated floor and wall assemblies shall be in accordance with ASTM E 2174, Standard Practice for On-Site Inspection of Installed Fire Stops.

6.12.2. Fire resistive joint systems and Perimeter fire barriers - 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.

6.12.3. Inspection of the cladding, roofing and glazing systems shall be carried out in each phase of the installation progress, ensuring the appropriate implementation of the Manufacturer's recommendations.

6.12.4. Work shall not be certified as completed unless approved by the inspecting agency.

6.12.5. Inspector Qualification

Inspection Agency preferably accredited to IAS AC 291, shall be registered, approved and acceptable to Civil Defence Authority.

6.13. Field Quality Control

- 6.13.1. Inspection of installations of systems shall take place in successive stages as installation proceeds.
- 6.13.2. The Contractor shall cooperate fully with inspecting agency and when requested, permit samples of materials to be taken from original packaging as the materials are applied to building surfaces.
- 6.13.3. Do not proceed with installation for the next area until inspecting agency determines completed work shows compliance with requirements.
- 6.13.4. The independent inspection agency and supplier's trained representative shall inspect installed systems, conduct material evaluation and application tests and prepare inspection reports.
- 6.13.5. Supplier's trained representative or Inspection agency shall state in each report whether inspected systems comply with or deviate from requirements.

6.14. Maintenance & Management

- 6.14.1. Provide protection and maintain conditions during and after installation that ensure installed fire stopping, curtainwall, cladding, roofing and glazing systems are without damage or deterioration at the time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated systems immediately and install new materials.
- 6.14.2. The condition of installed firestop systems shall be visually inspected by the owner or owner's inspection agency 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.
- 6.14.3. 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.