

# Fire Safety & Green Buildings – Complying with New DCD Codes



## Introduction

On January 30, 2018, Caparol Paints LLC delivered a Technical Workshop on Fire Safety in Green Buildings, which discussed the new challenges and methods for complying with the recent DCD (Dubai Civil Defense) Codes. The workshop was facilitated by Sumeet Parkar and Rania Haddad, both of Caparol, who provided an overview of the overlaps between fire safety and sustainability building design and their compliance requirements with the DCD codes.

## Background

### Fire & Green?

Buildings are structures that are enclosed with an envelope. The envelope system comprises of walls, roofs, slabs, floors, partitions, as well as fenestration such as windows, curtain glass, and sky lights. The building envelope must be well insulated and air tight to reduce the amount of building heat gains that are problematic to

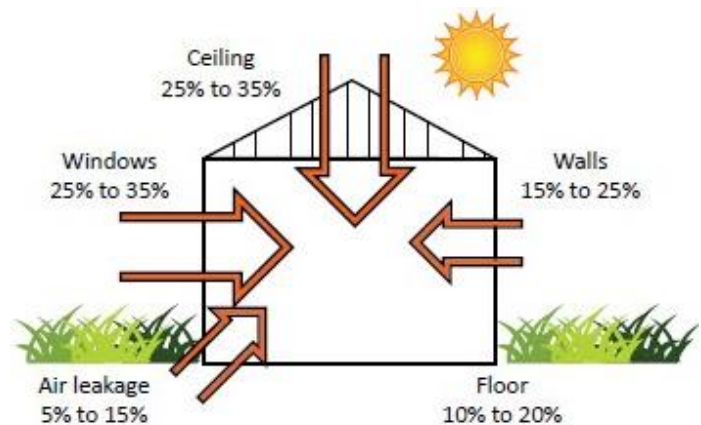


Figure 1 Heat gains onto a building by the external environment (heat transfer and air leakage)

the energy consumption of a building and its occupant thermal comfort. Thermal

insulation can be defined as the reduction of the effects of the various processes of heat transfer between the external environment and the internal spaces in a building. Such heat transfer is inevitable due to the difference in temperature and pressure between multiple surfaces. Another important factor of consideration in buildings envelopes are thermal bridges, which are heat transfer that occurs in specific places in a building assembly such as balcony slabs or window frames, which

are often risky if not insulated. Figure 1 illustrates more than one form of heat transfer and air leakage that a typical building is undergoing.

UAE's local regulations Estidama and Al Sa'fat mandate specific requirements for each envelope system and must be complied with during design and construction stages.

The building envelope thermal insulation material historically mostly depended on EPS (polyurethane-based materials) across the UAE. The DCD has recently launched the new Life and Fire Safety Code new regulations, which mandates to halt the use of any system component that doesn't achieve Class A under ASTM E84 a Standard Test Method for Surface Burning Characteristics of Building Materials.

### **Stakeholders**

The workshop welcomed a wide range of attendees ranging from suppliers and manufacturers insulation materials, ETICS/EIFS applicators, contractors, consultants, architects, as well as delegates from the Dubai Central Laboratory, a department under Dubai Municipality

## **Impacts of the New UAE Fire and Life Safety Code of Practice**

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### **Impact on Safety**

The new UAE Fire and Life Safety Code is primarily intended to secure buildings and proof it from fire threats. The new regulations introduce stringent requirements on the material selection, performance characteristics, QA/QC, and testing processes of insulating materials including the ETICS/EIFS.

### **Impact on Design**

The stringency of the new requirements will have direct impact on the way building envelope and ducts are designed and specified. Architects and consultants will need to be fully aware of the code and ensure compliance early in the design stage. This is because the envelope thermal performance is directly related to the material selection and sizing during the design stage. The industry must therefore secure compliance with both green building regulations as well as the UAE new Fire and Life Safety Code.

### **Impact on Business**

Businesses running manufacturing lines or business units related to material that is not complying with the new Fire and Life Safety Code will be directly impacted by the new requirements. Such business would need to either change their product line or attempt to improve the existing product and receive a DCD certification of their product. Although the industry may have different opinions on the practicality of the new requirements, it's undebatable that DCD are putting their best efforts forward to ensure paramount health and safety of building occupants.

## Path to Compliance

### ETICS / EIFS

Caparol Paints LLC has recently received the DCD certification for their envelope system using Mineral Wool boards tests and certified for Class A under ASTM E84. Through this workshop they have shared their lessons learned. Businesses should explore new material alternatives to achieve product certification and code compliance. ETICS (External Thermal Insulation Composite System) that is also referred in other regions as EIFS (Exterior Insulation & Finish System); can be a good example for tackling the impact of new codes.

ETICS/EIFS technology ensures safety, durability and longevity, but more importantly it ensures fire resistance provided by the mineral wool insulation core as well as a low Lambda value  $\lambda(w/mK)$ , which is the value of the insulating capacity of product designed for thermal performance. The high performance mineral wool insulation offers improved fire resistance capabilities when compared to standard EPS insulation systems. ETICS/EIFS is applied at the external surface of a wall and thus can be a very viable retrofit solution on existing buildings. Based on figure 2, the ETICS thickness influences the allocation of the temperature gradation/drop of temperature

### Project Approvals

The typical ETICS/EIFS project workflow would start in the design stage, whereby the specifications are harmonized with the requirements of both green building regulations and the new Fire

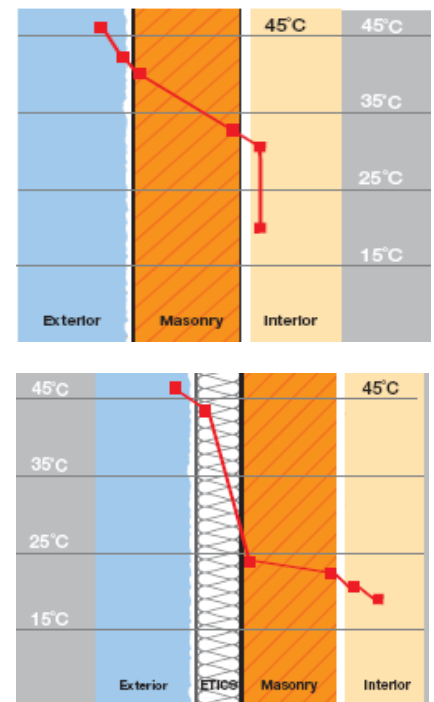


Figure 2 Above: heat transfer without insulation. Below: heat transfer with ETICS insulation

and Life Safety Code. The general approval by DM (Dubai Municipality) would then help the fire specialist submit their design, including material submittals, for DCD approval. This is done in parallel with approving the thermal insulation applicator. The applicator applying the system must also be approved by the DCD as well as the system manufacturer/supplier. Fire consultants are responsible for initiating the project-based approvals. The next step would be submitting for DM approval this typical project flow is illustrated in figure 3 below.

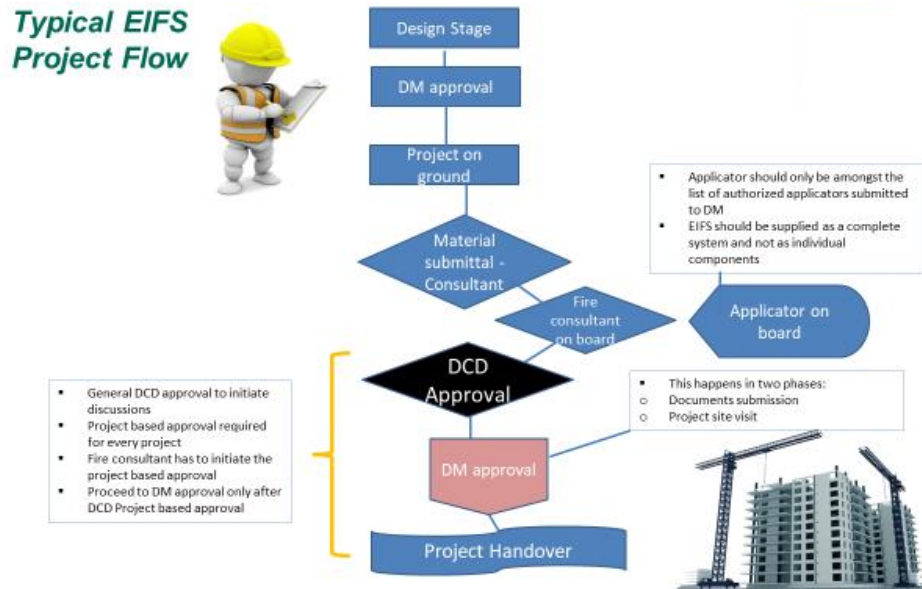


Figure 3 Typical EIFS/ETICS project workflow

## Product Registration

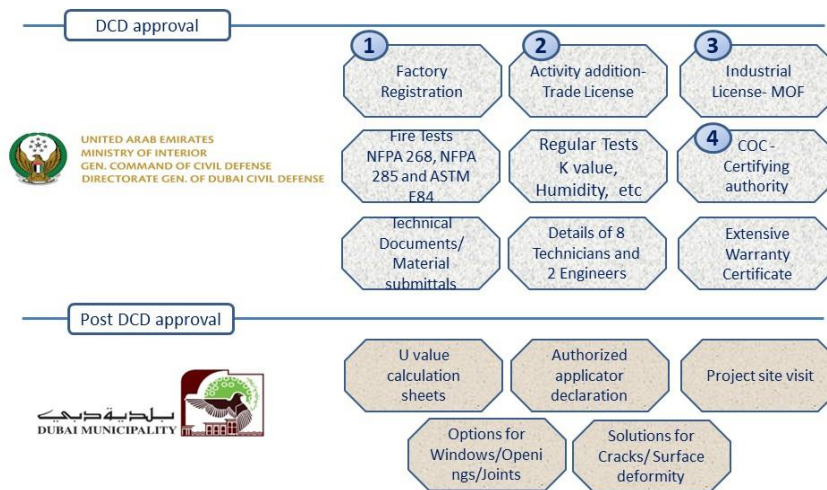


Figure 4 Product registration with DCD and DM

Illustrated in figure 4, product registration is a two-step process starting with DCD approval and ultimately followed by DM approval. Included in this process is a rigorous procedure of testing and certifying the system for the new requirements of the code. The required tests are NFPA 285, NFPA 268 and ASTM E84.

## Challenges Facing ETICS/EIFS

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### Awareness

Awareness among consultants is a challenge but an important step to accelerate the use of ETICS/EIFS. There is a general perception of ETICS/EIFS being mechanically (structurally) problematic post-installation; however, this is mainly due to the poor installation or poor handling by the applicator.

### Skilled Applicators

Applicators must be hired only if approved by the DCD and DM. Experience is critical with handling ETICS since cracks might appear if ETICS is placed on columns and beams only. This is due to the difference in material characteristics and hence, material dynamics will cause cracks. Therefore, ETICS is only useful if installed properly to insulate the whole facade and by the qualified applicators.

## Discussions & Conclusion

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The workshop included an active discussion on the attendees' views and concerns with the new code. It was generally agreed that the authority should consider the technical proposals provided by the manufacturers, which eases the impact of the code while meeting the thermal insulation and fire safety requirements.

For example, it was reasoned by one of the attendees that fire spreads on façade may be due to the internal stack effect within the building that is due to air balancing and pressurizations issues. Air balancing has implications on both fire safety and energy performance since UAE's buildings are mostly over pressurized with outside air.

Another concern raised by consultants' present was that authorities may not be fully aware of the EIFS practicalities and consultants often end up facing issues receiving the required authority permits. This is believed to be a result of the misperception caused by the poor practice by both

applicators and manufacturers. The workshop facilitators have shared that they are currently working with DM to sort this out and approve ETICS/EIFS, hopefully closing the issues faced by consultants. ETICS/EIFS is slowly getting traction and gradually competing with other material alternatives.

DCL highlighted the history of the development of the new code, which was a response to the industry's needs. In April 2017, the DCL and DCD codes were harmonized and published on July 2017.

Attendees from the supplier/manufacturing sector highlight that EPS can be safe and is widely used across the UAE. The concern was why the authority wouldn't accept EPS droplets, since droplets remain inside the system. DCL confirmed that decision making to such concerns can only be addressed by DCD.

DCL took the initiative in 2017 to postpone certain requirements to accommodate the industry's needs. This has given the companies a time to adapt and act. DCL is said to be in touch with DCD for modifications and changes to streamline the code for the industry. DCL is also building a lab for fire testing of all types of materials.

Workshop attendees agreed that businesses of this specific material market are not here to compete but rather to collaborate and be transparent to work together with the authorities to produce standards that are tailored for each type of case/project rather than a standard that fits all.