

# CHAPTER 3: Modern Methods of Construction

## CONTENTS

3.1.1 INTRODUCTION

3.1.2 SUITABILITY OF SYSTEMS AND COMPONENTS

3.1.3 TYPES OF MODERN METHODS OF CONSTRUCTION (MMC)

3.1.4 SUITABILITY OF SYSTEMS TO MEET WARRANTY REQUIREMENTS

# FUNCTIONAL REQUIREMENT

## 3.1 MODERN METHODS OF CONSTRUCTION (MMC)

### Workmanship

- i. All workmanship must be within defined tolerances as defined in Chapter 1 of this Manual.
- ii. All work to be carried out by a technically competent person in a workmanlike manner.
- iii. Certification is required for any work completed by an approved installer.

### Materials

- i. All materials should be stored correctly in a manner which will not cause damage or deterioration of the product.
- ii. All materials, products and building systems shall be appropriate and suitable for their intended purpose.
- iii. The structure shall, unless specifically agreed otherwise with the warranty provider, have a life of not less than 60 years. Individual components and assemblies, not integral to the structure, may have a lesser durability but not in any circumstances less than 15 years.

### Design

- i. Design and specifications shall provide a clear indication of the design intent and demonstrate a satisfactory level of performance.
- ii. Structural elements outside the parameters of Approved Document A (England and Wales) Section 1 (Scotland) and Technical Booklet D (Northern Ireland) must be supported by structural calculations provided by a suitably qualified expert.
- iii. The construction must meet the relevant Building Regulations and other statutory requirements, British Standards and Euro-Codes
- iv. All MMC systems must be assessed and approved by a recognised third party assessment body.

### 3.1.1 Introduction

Modern methods of construction (MMC) are being used in the construction industry particularly for housing as they potentially represent savings in time and materials, as well as higher standards of quality over more conventional methods of construction.

#### Key points to note are:

- Off-site assembly means quick erection times on-site and a quick weather tight construction achieved.
- Accurate setting out of foundations etc; needs to be managed.
- MMC, particularly modular systems and large panel systems will require advanced planning of the site for both access, off loading, installation and possibly storage of systems.
- The construction design and layout of a typical system is planned in advance, so last minute changes have to be avoided by good project management and what is known as a 'Design Freeze' imposed in advance of production commencing in the factory.
- The quality of the final product will rely on accurate assembly on-site by factory trained or authorised specialist contractors.
- Modern methods of construction take advantage of offering standardised construction and may not be adaptable for complex architectural or planning design requirements. Additional testing may be necessary to ensure standards for durability and weather tightness can be achieved, e.g. incorporating flat roof

drainage outlets through closed panel parapet extensions.

### 3.1.2 Suitability of systems and components

It is important to ensure that Modern methods of construction, products or systems:

- Meet the requirements of British Standards or Codes of Practice or equivalent European Standard current at the time of application.
- Is a material / product or system covered by a current approval from an independent third party technical approval body which is accepted by Premier Guarantee. This would be either a UKAS accredited or a European equivalent accredited organisation such as ILAC (International Laboratory Co-operation). Details of the testing body accreditation will need to be supplied as well as the certification document.
- Any independent third party testing must recognise UK Building Regulation requirements and additional Warranty standards. Details of the performance and the limitations of use of the material / product or system tested must be provided.
- Any product bearing a CE marking in accordance with the Construction Products Directive shall be supported by evidence of testing carried out on the product.

Construction methods which cannot meet the requirements of this Technical Manual must be approved in advance by Premier Guarantee early at the design stage and well before commencement on-site.

Modern methods of construction, products or systems, that have third party approval, will still need to be structurally approved on a site by site basis depending on the layout and loading of the component. Thermal properties and measures to prevent condensation will also require specific assessment depending on exposure, orientation etc.

### 3.1.3 Types of modern methods of construction (MMC)

MMC this applies to systems and components usually fall into the following categories:

- Volumetric or modular construction
- Panelised
- Hybrid (semi-volumetric)
- Site-based systems

Most MMC components are usually site based e.g. Insulated Concrete Formwork Systems.

### 3.1.3.1 Volumetric

Volumetric construction (also known as modular construction) involves the 'off-site' production of three-dimensional units. Quality controlled systems of production in the factory should be in place and expected as part of any third party approval. Modules may be brought to site in a variety of different forms, ranging from a basic structural shell to one where all the internal and external finishes and services are already installed.

Volumetric construction can consist of timber frame, light gauge steel as well as concrete or composite constructions. External cladding may form part of the prefabricated system with only localised on-site specialist sealing required.

Alternatively, traditional masonry cladding may need to be constructed, in which case specific detailing for support of claddings, cavity barriers and damp proof courses must be pre-agreed and checked by Site Managers.

### 3.1.3.2 Panelised

The panel units are produced 'off-site' in a factory under a quality controlled process and assembled on-site to produce a three-dimensional structure. The panels may consist of wall, floor or roof units, and are sometimes referred to as cassettes.

### 3.1.3.3 Closed panels

They involve the factory installation of lining materials and insulation. They may be constructed

of timber, steel frame or concrete panels. Panels can often include services, windows, doors and finishes.

### 3.1.3.4 Open panel systems

Open panel systems do not include insulation, lining boards, vapour control layers etc. These are applied to the frame system on-site, together with the external cladding and internal finishing. Therefore, careful control of on-site finishing will be required as well as ensuring the panels are protected against the elements until weather tight.

'Conventional' timber frame panels are typically classed as 'open panel systems' and would normally arrive on-site with the sheathing board fixed but without insulation or internal boards. For Warranty purposes, these types of open panel systems can normally be classified as established or traditional construction, however confirmation will be required that such open panel systems have quality assured systems in place and are either registered with the Timber Frame Association or TRADA BM. (see the Timber Frame Chapter within this Technical Manual for general guidance on conventional timber frame construction).

**Please note:** Bespoke timber frame open panel systems which do not have such QA procedures will need either third party accreditation or independent Structural Engineer supervision to be provided to monitor the installation, erection and completion (sign off) of the system.

Structurally insulated panels (SIP's) are a form of composite panel. Only systems which have independent third party approval will meet the requirements of the Technical Manual.

Curtain walling is also a form of panellised construction. It is normally non-load bearing, acting purely as a rain screen. Curtain walling is covered elsewhere in this Manual, but the system should have current independent third party certification. Systems certified and tested to meet the CWCT standard for walls with ventilated rain screens will also be acceptable to Premier Guarantee.

### 3.1.3.5 Hybrid

Again, off-site manufactured this combines both panellised and volumetric approaches. Typically, volumetric units, e.g. 'pods' for student accommodation or hotels.

### 3.1.3.6 Sub-assemblies and components

This category covers factory built sub-assemblies or components in an otherwise traditionally built structural form. Typically, schemes incorporating the use of floor or roof cassettes, precast concrete foundation assemblies, preformed service installations, cladding systems etc.

### 3.1.3.7 Site-based systems

These are structural systems that fall outside the 'off-site manufactured' categories such as Insulated Concrete formwork (ICF). Only systems which have independent third party approval

## CHAPTER 3: Modern Methods of Construction (MMC)

will meet the requirements of the Technical Manual. The acceptability of these systems relies heavily on the quality procedures in place for the installation of the system on-site - in accordance with third party approval.

### 3.1.4 Suitability of systems to meet Warranty requirements

Please also refer to the requirements in Chapter 2 Materials of this Technical Manual.

An independent third party assessment of the system / product must recognise UK Building Regulation requirements and our additional Warranty standards.

Details of the performance and the limitations of use of the material / product or system tested must be provided to determine if the requirements of the Technical Manual are met.

The independent assessment, e.g. A European Technical Assessment, must provide details of performance and testing carried out in the following areas to demonstrate acceptability to the Warranty provider;

- Structural integrity
- Performance in fire situations
- Resistance to water penetration (consider exposure rating of location), vapour permeability and dangerous substances
- Safety in use
- Acoustic characteristics
- Thermal and movement characteristics
- Compatibility of materials (interaction between

components, structural or otherwise)

- Durability and longevity of materials (60 year life span in accordance with CML requirements)
- Maintenance issues

Structural performance must be identified against appropriate BS EN standards. The Developer must provide actual structural calculations for each project on a case by case basis and the design shall allow for robustness to disproportionate collapse.

Where the independent certification does not recognise our Warranty requirements additional checks may be required to confirm the system is acceptable. For example, the need to provide a drained cavity behind some insulated cladding systems to timber and steel framed systems. Supporting evidence of testing undertaken to prove the system may be asked for.

Durability and weather tightness are key aspects of the Technical Manual requirements and the track record of the MMC will need to be established.

Evidence of experience gained elsewhere where environmental conditions may be significantly different will need to be assessed in comparison with conditions here in the UK.

Treatment of timber components will need to be assessed with regard to the species of the timber used. The natural durability and the need for preservative treatment is dependent on the component's location in the construction and in the Warranty requirement for durability. Treatment

for insect attack in certain parts of the country will also be required.

Detailing is critical in providing integrity to the building, e.g. connections between a wall panel and a window unit. Supporting documentation must show the make up of the tested system. When assessing projects, a particular design detail may not have been covered by the MMC certification, e.g. a balcony junction. This information needs to be made known at an early stage.

Certain components of a building have their particular functions and may not be replaced by components that look similar but might structurally behave in a different manner. Similarly, a product that has a third party assessment for a particular use may not be acceptable in a different form of construction.

The continuation of Quality Management Systems from manufacture to erection on site need to be demonstrated. The level of supervision of the systems on-site is critical in order to meet the requirements of this Technical Manual.