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Construction Productivity Centre

30 November 2015

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Dear Sir/Madam

AMENDMENTS TO BUILDING CONTROL (BUILDABILITY AND PRODUCTIVITY) REGULATIONS TO FURTHER RAISE PRODUCTIVITY IN THE BUILT ENVIRONMENT SECTOR

Objective

1 This circular is to inform the industry of the following new buildability requirements in the Building Control (Buildability and Productivity) Regulations 2011 (“Buildability Regulations”) which will come into operation on **1 December 2015**:

- (A) New higher minimum Buildable Design Scores (B-Scores) and Constructability Scores (C-Scores) for projects.
- (B) Revised Buildable Design Appraisal System (BDAS) with the mandatory adoption of new items such as standard storey heights for hotels and prefabricated components for specific types of projects.
- (C) Revised requirements and new accreditation requirement for Prefabricated Prefinished Volumetric Construction (PPVC).
- (D) Revised Constructability Appraisal System (CAS) including changes to the maximum constructability score allocated to both the architectural, mechanical, electrical and plumbing (AMEP) component and the component on Good Industry Practices.

Background

2 In November 2014, BCA raised the minimum buildability standards and introduced the mandatory adoption of standard components and building systems such as precast staircases and drywall for residential non-landed

developments. At the same time, minimum prefabrication levels, minimum adoption rate of Prefabricated Bathroom Units (PBUs) and PPVC were mandated for specific Government Land Sales (GLS) sites to encourage off-site construction as part of the larger drive towards Design for Manufacturing and Assembly (DfMA).

3 As announced in March 2014, the legislated minimum B-Score and C-Score requirements would be raised further in 2015. Further to this, BCA has also amended the Buildability Regulations and revised the BDAS and CAS to drive greater productivity improvements for the entire industry as described in detail below.

(A) Higher Minimum B-Scores and C-Scores Requirement

4 The legislated minimum B-Scores for **all new building projects** with Gross Floor Area (GFA) of 2,000m² or more which are **submitted for planning permission** on and after **1 December 2015** will be raised by 3 points. With this increase, the minimum B-Scores for all new building projects will be brought to the same level as those imposed for projects by key GPEs since 1 November 2014.

5 Similarly, the legislated minimum C-Scores including the minimum C-Scores for the Structural System (structural C-Score) for **all new building projects** with GFA of 5,000m² or more which are **submitted for planning permission** on and after **1 December 2015** will be raised by 3 points. In response to industry feedback, a new category of low-rise building projects of 6 storeys and below has been introduced. For this category, the minimum structural C-Score will not be raised. Please refer to Annex A for the new minimum B-Scores and C-Scores affecting such projects from 1 December 2015.

(B) Revised Buildable Design Appraisal System (BDAS)

6 To promote greater standardisation and further raise the adoption rate of productive components, the following items have been made mandatory:

Applicable to Types of Development	Mandatory Items to Adopt
All developments	Welded mesh for cast-in-situ concrete floor
	Prefabricated and pre-insulated duct for air-conditioning systems

Residential (non-landed) and residential non-landed component of mixed-use developments	Precast household shelters (for designs that incorporate household shelters)
Hotel developments	Typical storeys standardised to either 3.15m, 3.3m, 3.325m, 3.45m, 3.5m or 3.6m

(C) Revised requirements and new acceptance framework for Prefabricated Prefinished Volumetric Construction (PPVC)

7 The minimum level of finishing and fittings to be completed off-site for PPVC construction has been fine-tuned to drive greater productivity standards achievable by PPVC construction.

8 In addition, to establish minimum manufacturing quality of PPVC systems intended for use at mandated GLS sites sold on or after **1 December 2015**, these PPVC systems will be subject to a new acceptance framework being the PPVC Manufacturing Accreditation Scheme (PPVC MAS). PPVC systems must first be accepted by the Building Innovation Panel (BIP) before they will be accredited under the PPVC MAS. Please refer to Annex B for the revised requirements on level of finishing and fittings off-site and for more details on the BIP and PPVC MAS.

(D) Revised Constructability Appraisal System (CAS)

9 The CAS has been fine-tuned to place greater emphasis on more impactful productive construction methods and technologies as well as practices that help to enhance project efficiency. Key changes include adjustments to the maximum constructability points allocated to the architectural, mechanical, electrical and plumbing (AMEP) component and the component on Good Industry Practices and points given for the use of Virtual Design and Construction (VDC), an integrated approach that combines Building Information Modelling (BIM) and advanced management methods to improve productivity.

10 The details of the new minimum B-Score and C-Score standards, the revised BDAS, CAS, requirements and the new acceptance framework for PPVC can be found in the revised Code of Practice on Buildability 2015 which is available from BCA website starting 1 December 2015.

Clarification

11 If you or your members have any queries concerning this circular, please contact Mr James Lu at 6804 4233 (email: james_lu@bca.gov.sg) or Ms Jenny Tan at 6804 4230 (email: jenny_xy_tan@bca.gov.sg).

12 For queries on the adoption of PPVC or the requirements and acceptance framework for PPVC, please contact Dr Eric Ong at 6804 4241 (email: eric_ong@bca.gov.sg).

Thank you.

Yours faithfully

A handwritten signature in black ink, appearing to be 'Foo-Leoh Chay Hong', written over a horizontal line.

FOO-LEOH CHAY HONG (MRS)
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A New Minimum Buildable Design Score (B-Scores) for all new building projects

Year	From 1 December 2015*		
CATEGORY OF BUILDING WORK/ DEVELOPMENT	MINIMUM BUILDABLE DESIGN SCORE		
	2,000 m ² ≤ GFA < 5,000 m ²	5,000 m ² ≤ GFA < 25,000 m ²	GFA ≥ 25,000 m ²
Residential (landed)	73	78	81
Residential (non-landed)	80	85	88
Commercial	82	87	90
Industrial	82	87	90
School	77	82	85
Institutional and others	73	79	82

**based on date of planning submissions made to URA except for projects built on land sold under GLS Programme which are based on date of the GLS land sold.*

B New Minimum Constructability Score (C-Scores)

B.1 For all new building projects more than 6 storeys

Year	From 1 December 2015*	
CATEGORY OF BUILDING WORK / DEVELOPMENT	MINIMUM CONSTRUCTABILITY SCORE	
	5,000 m ² ≤ GFA < 25,000 m ²	GFA ≥ 25,000 m ²
Residential (landed)	50 (min 35 points from Structural System)	60 (min 45 points from Structural System)
Residential (non-landed)		
Commercial		
Industrial		
School		
Institutional and others		

**based on date of planning submissions made to URA except for projects built on land sold under GLS Programme which are based on date of the GLS land sold*

B.2 For all new projects of 6 storeys and below

Year	1 December 2015*	
CATEGORY OF BUILDING WORK / DEVELOPMENT	MINIMUM CONSTRUCTABILITY SCORE	
	5,000 m ² ≤ GFA < 25,000 m ²	GFA ≥ 25,000 m ²
Residential (landed)	50 (min 32 points from Structural System)	60 (min 42 points from Structural System)
Residential (non-landed)		
Commercial		
Industrial		
School		
Institutional and others		

**based on date of planning submissions made to URA except for projects built on land sold under GLS Programme which are based on date of the GLS land sold*

MINIMUM REQUIREMENTS AND ACCEPTANCE FRAMEWORK FOR PREFABRICATED PREFINISHED VOLUMETRIC CONSTRUCTION

This section covers the minimum requirements and acceptance framework for Prefabricated Prefinished Volumetric Construction (PPVC) systems used for the building or the component of the building on selected land parcels sold under the Government Land Sales (GLS) Programme on and after **1 December 2015**. The land parcels selected are gazetted and may be found in the Building Control (Buildability and Productivity) Regulations.

The minimum level of use of PPVC shall be 65% of the total super-structural floor area of the building or the component of the building that is to be used for residential or private dwelling purposes. Total super-structural floor area refers to the total constructed floor area of the building consisting of the ground floor and all floors above the ground floor, but excluding any floor area constructed for use as a roof or car park.

1. Definition

“Prefabricated Prefinished Volumetric Construction (PPVC)” means a construction method whereby free-standing volumetric modules (complete with finishes for walls, floors and ceilings) are —

- (a) constructed and assembled; or
- (b) manufactured and assembled,

in an accredited fabrication facility, in accordance with any accredited fabrication method, and then installed in a building under building works.

2. Requirements for Prefabricated Prefinished Volumetric Construction

For the purposes of Regulation 4B(4)(b) of the Building Control (Buildability and Productivity) Regulations, the volumetric modules used for PPVC shall comply with the following requirements:

Minimum level of finishing and fittings to be completed off-site

- 2.1** The extent of finishing and fittings to be completed off-site for the volumetric modules shall comply with the minimum levels stipulated in

Table 1. Where any deviation from these minimum levels is necessary, prior approval shall be sought from BCA.

Element	Minimum level of completion off-site
Floor finishes	80%
Wall finishes	100%
Painting	100% base coat, only final coat is allowed on-site
Windows frame & Glazing	100%
Doors	100%, only door leaves allowed for on-site installation
Wardrobe and Cabinets	100%, only wardrobe and cabinet doors allowed for on-site installation.
M&E including water & sanitary pipes, electrical conduits & ducting	100%, only equipment and fixtures to allowed for on-site installation
Electrical sockets and light switches	100%, only light fittings allowed for on-site installation

Table 1 - Minimum level of finishing and fittings to be completed off-site

Water tightness and prevention of corrosion where steel is used as the primary structural material

- 2.2** The steel shall be galvanised in accordance to ASTM A 123/A 123M or alternative equivalent standards.
- 2.3** The volumetric modules shall be designed and fabricated to:
- (a) prevent water from entering the modules (e.g. by means of waterproofing membrane or other means at the joints and gaps between the modules); and
 - (b) allow any water in between the volumetric modules and façade, and in between the modules to be properly discharged and drained completely.
- 2.4** Floor areas intended to be wet (e.g. bathrooms, kitchens) and areas that could be potentially exposed to water (e.g. fire sprinkled areas) shall be treated with waterproofing membrane to ensure water-tightness.

3. Acceptance Framework for Prefabricated Prefinished Volumetric Construction (PPVC)

The acceptance framework consists of two parts – the Building Innovation Panel (BIP) and the PPVC Manufacturer Accreditation Scheme (PPVC MAS).

- 3.1** Under the new acceptance framework for PPVC systems to be used at the mandated GLS sites, PPVC suppliers and manufacturers are required to submit their applications and proposals to the Building Innovation Panel (BIP).
- 3.2** The PPVC system and the in-built bathrooms (if any) shall comply with the requirements of the BIP. The accepted PPVC systems including the in-built bathroom (if any) and their respective suppliers/manufacturers will be listed on the BCA website at <http://www.bca.gov.sg/BuildableDesign/ppvc.html>. Relevant letters of In-Principle Acceptance (IPA) will also be issued to the PPVC supplier/manufacturer.
- 3.3** In addition, the production facilities producing PPVC systems which have been accepted through the BIP will be required to be accredited under the PPVC MAS, which is managed by the Singapore Concrete Institute (SCI) and the Structural Steel Society of Singapore (SSSS) as part of the effort to promote greater self-regulation by the industry. The accreditation criteria were jointly developed by SCI, SSSS and BCA. Further details on the accreditation scheme can be found at www.scinst.org.sg and www.ssss.org.sg.