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Special Functions Group (#10-01)

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Dear Sir/Madam

DESIGN OF STRUCTURAL STEEL IN BUILDINGS (INCLUDING PRE-FABRICATED & PRE-FINISHED VOLUMETRIC CONSTRUCTION) – GUIDELINES ON PROVISION FOR CORROSION PROTECTION AND PERIODIC STRUCTURAL INSPECTION

Background

Unlike concrete structures, structural steel elements are more prone to corrosion effects due to water seepage from wet areas. To ensure that key structural steel elements remain serviceable and corrosion-free during the life of the building, adequate provisions should be made during the design of these buildings to prevent corrosion and to facilitate inspections, especially when the structural steel elements are concealed, for example in Pre-Fabricated & Pre-Finished Volumetric Construction (PPVC) with structural steel.

2 These guidelines on protection of key structural steel elements against corrosion and provisions for inspection of concealed key structural elements are for cases where the structural steel elements are concealed, and they do not apply to composite steel-concrete structures where the structural steel is encased in concrete.

Protection of key structural steel elements against corrosion

3 In the design of key structural steel elements which are concealed, the QP (Design) should ensure that all the key structural steel elements are adequately protected against corrosion. The two areas which the QP should consider in the design are –

- a) preventing water seepage through adequate water-proofing of the floor and wall systems at wet areas, for example through use of suitable topping up of the floor or membranes; and
- b) using an appropriate coating system or other equivalent method (such as providing additional sacrificial thickness of structural steel) to provide the necessary durability of the structural steel.

Provisions for inspection of concealed key structural elements

4 In cases where the key structural steel elements are in concealed locations (such as in steel PPVC buildings), the QP (Design) for structural works should provide in his design specific methodologies to enable inspections of the structural steel elements for the purposes of the mandatory Periodic Structural Inspections (PSI) under Section 28, Part V of the Building Control Act.

5 The design methodologies should include provisions to adequately conduct PSIs of the concealed steel elements with reasonable effort. This should include the following provisions –

- a) Details of locations and types of inspection access points to allow the key structural steel elements to be visually inspected. Where practicable, predetermined inspection access points should be provided at strategic locations to allow representative views of the structural conditions of any concealed key structural steel elements. The inspection access points should be detailed adequately to –
 - i) be easily identifiable by the Structural Engineer carrying out the PSI;
 - ii) comply with any fire safety requirements; and
 - iii) allow the fire-proofing to be easily restored after the inspection.
- b) Inspection methods and equipment that will enable inspection of the structural condition of the concealed key structural steel elements for PSI purposes. The inspection methods or equipment proposed should be capable of detecting the presence of water seepage or other detrimental environmental conditions and any signs of structural deterioration or distress such as corrosion, cracking or deformation.
- c) Where inspection of concealed key structural steel elements through provisions in (a) and (b) above are not available, other provisions, such as additional sacrificial thickness of structural steel or other durable coating system, should be provided to ensure the continued structural safety of the building over its intended life span. In this instance, the QP (Design) should provide technical basis and justification for adopting this approach.

Details to be shown at submission for structural plan approval

6 The QP (Design) should document the design provisions meeting the above guidelines in the submission for structural plan approval for the project, which will include detailed method statements and drawings showing the type of corrosion protection, locations of the inspection access points, types of equipment to be used, and any calculations or documents supporting their methodology, when key structural steel elements are to be concealed.

7 I would appreciate it if you could bring to the attention of your members the contents of this circular. Please contact Mr. Richard Lim (at Tel. 68044470 or email: richard_lim@bca.gov.sg) or Mr. Jonathan Kok (at Tel. 68044650 or email: jonathan_kok@bca.gov.sg) if you need further clarification.

Thank you.

Yours faithfully

A handwritten signature in black ink, appearing to be 'K Thanabal', written in a cursive style.

K THANABAL
GROUP DIRECTOR, SPECIAL FUNCTIONS GROUP
for COMMISSIONER OF BUILDING CONTROL
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