Building and Construction Authority

7 June 2007

See Distribution List

Dear Sir/ Madam,

BCA/ FSSD Joint Circular-
Fire Protection Requirements in Design of Steel Structures

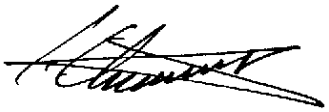
The recent disruption of supply of sand and granite is a wake-up call to the industry to diversify our supply sources and switch to sustainable construction as much as possible so as to reduce our reliance on concrete materials. The use of structural steel is one way to reduce our reliance on sand and granite, and BCA is actively encouraging the industry to adopt steel construction. Steel construction has a number of advantages, being more buildable, imposes a lighter load on the foundation and could be completed faster.

2 In our consultation with industry on the use of steel construction, we noticed that there is a perception amongst some that fire-protection of steel structures is too onerous. To clear this concern on fire-protection requirements for steel structures, BCA and FSSD have jointly prepared a FAQ which aims to clarify the requirements in the Fire Code and ensure that there will be no misconception about fire-protection of structural steel in buildings. A copy of the FAQ is attached.

3 In order to facilitate the switch from concrete to steel structures, we wish to inform you that BCA and FSSD have provided a Green Lane system to accord priority in the processing of amendment plans for projects which will be making the switch. Furthermore, FSSD is currently reviewing the Fire Code, especially the part on prescribed rules and the revised code is expected to be ready by September 07.

4 We would appreciate if you could disseminate the contents of this letter to your members. Please contact Ms. Sok Cui Ping (Tel: 63252103, email: sok_cui_ping@bca.gov.sg) or Mr. Lee Wee Keong (Tel: 68481445, email: lee_wee_keong@scdf.gov.sg) if you require further clarification. Thank you.

Yours faithfully



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Q&A TO CLEAR MISCONCEPTIONS ON THE USE OF STRUCTURAL STEEL

General

Q1 Is the fire-protection requirement for structural steel in Singapore more stringent than in other developed countries?

A1: The Singapore Fire Code is derived from established UK fire code. Our Fire Code allows designers to adopt either performance-based fire engineering design or the prescribed rules. Performance-based approach allows more flexibility in complying with the fire requirements and is benchmarked to similar practices in developed countries. It allows designers who feel that the prescribed rules may not be suitable for their building design to opt for performance-based design.

FSSD is currently reviewing the Fire Code, especially the part on prescribed rules and the revised code is expected to be ready by Sept 07.

Q2 Must all structural steel members in a building be fire protected?

A2: If the design is based on the prescribed rules of the Fire Code, it is correct to say that all the key structural steel members must be fire protected. However, under the performance-based design, fire engineering analysis can be carried out to assess the performance of the steel construction under fire and where it is possible for the steel construction to withstand the designed fire without the need for protection, FSSD may approve the performance-based design. There are examples of existing buildings where some of the structural steel members in the building are not fire-protected, such as the National Library Building and the Ang Mo Kio Hub.

Q3 Are fire-safety requirements are more stringent for buildings of steel construction than for buildings of concrete construction?

A3: The fire-safety requirements are the same for both types of buildings. Only the methods of protection are different, depending on whether the material is of steel or concrete.

Q4 Is the requirement of minimum period of fire resistance more stringent for buildings of steel structure than for buildings of reinforced concrete structure?

A4: The minimum period of fire resistance or fire-rating is dependent on factors such as the usage, floor area, habitable height, and cubicle extent of the building. It is not dependent on the type of building materials, i.e. reinforced concrete or steel.

Concrete encasement

Q5 Must steel columns be encased in concrete for fire protection?

A5: A wide range of products and systems are available to protect structural steelwork from fire. An appropriate type of protection can be selected based on needs of the client. Besides concrete encasements, there are other passive fire protection systems such as fire rated boarded systems, spray applied systems and intumescent paint systems.

Intumescent products

Q6 Is it possible to express the shape of structural steel members for aesthetic reasons instead of covering it up to meet fire protection requirement?

A6: The use of intumescent coating to give fire protection to steel structure is permissible as long as it is applied appropriately and the environment in which the structure is subjected to is non-detrimental to the fire protective properties of the coating.

Q7 Why is intumescent paint in Singapore very much more expensive compared to other countries?

A7: The high price of intumescent products here is due to the lack of demand for them. If there is sufficient demand for such products with the increase usage of steel structures, more firms will enter the market and the price is expected to drop.

Q8 There is a limited number of approved intumescent paints in Singapore. Will new intumescent paint system be acceptable?

A8: There are currently a few brands of intumescent paint system which had passed the tests at PSB and is acceptable to FSSD. These approved intumescent paints should be adequate for the current volume of construction work. As for the approval of new intumescent paint system, it has to undergo the required tests to demonstrate that it can meet the requirements stipulated in the Fire Code before it can be used as fire-protection system.

Boarded systems

Q9 Can fire-rated boards be used to protect steel buildings which exceed a height of 24 m?

A9: Fire-rated boards are permitted to be used for protection to structural steel beams and columns in buildings not exceeding the habitable height of 24 metres; and

to beams only, except transfer beams, in buildings exceeding the habitable height of 24 metres.

FSSD is currently reviewing the Fire Code, including the part on the use of fire-rated boards, and the revised code is expected to be ready by Sept 07.

Q10 Must fire-rated boards be constructed to be in full contact with the steel element?

A10: It is not necessary that the fire-rated boards must be constructed to be in full contact with the steel element. Gaps between the board and steel element can be allowed, but the gaps have to be filled with non-combustible materials such as concrete, gypsum or cement grout so that the boards will not be easily dented and broken under impact.

Q11 Must all gaps within the fire-board cladded steel columns be filled with concrete?

A11: Besides concrete, other non-combustible materials could be used to fill up the gaps, for example, cement grout or gypsum. The purpose of the filling is to provide support to the boards to prevent them from being damaged due to impact.