

**SINGAPORE CIVIL DEFENCE FORCE  
FIRE SAFETY BUREAU**

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Our Ref: FSB 37/86  
FSB 32/86

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25 May 99

**ANNEX 10**

Registrar, Board of Architects (BOA)  
Registrar, Professional Engineers Board (PEB)  
President, Singapore Institute of Architects (SIA)  
President, Institution of Engineers, Singapore (IES)  
President, Association of Consulting Engineers, Singapore (ACES)

Dear Sirs

**STRUCTURAL LOADING OF FIRE ENGINE ON HARDSTANDING &  
ACCESSWAY**


The above issue was tabled for discussion at the FSB Standing Committee on 08 Mar 99 in response to queries on hardstanding and accessway design.

2. FSB has collated additional information to facilitate structural engineers in the design of the hardstanding and fire engine accessway. The additional information, tabled in Annex A, was discussed and accepted by the FSB Standing Committee on 10 May 99.

3. For further clarification, please contact Mr Edmund Choo Boon Chin of FSB at Tel No 8386392.

4. We would appreciate it if you could convey the contents of this letter and the attached information listed in Annex A to members of your Institution/ Association/ Board.

Yours faithfully

  
Teo Lim Teck  
Secretary  
FSB Standing Committee  
for Commissioner  
Singapore Civil Defence Force

Annex A-1

(i) In general, the minimum width of the hardstanding shall be 6.0m wide and the minimum length shall be 15m long. Diagram A shows the relationship between the hardstanding space and parked fire engine with its stabilisers, front and rear jacks extended. Hardstanding sizes

(ii) Hardstanding and accessway shall be on Hardstanding and accessway loading

(a) Suspended slabs, or  
(b) on metalled or paved ground, or  
(c) ground laid with strengthened perforated slabs or  
(d) approved materials

to withstand the loading requirements of fire engine.

(iii) The hardstanding required to serve building exceeding 24m in habitable height shall be constructed to sustain the load of a 44-tonne fire engine with wheels, jacks and stabiliser loads as shown in Diagram 4.2.3(b)(iii). The wheel load shall be considered separately with the jack and stabiliser loads for both global and local effects.

(iv) Wheel load for accessway and hardstanding shall be as follows: Wheel load and load factor

1 <sup>st</sup> & 2 <sup>nd</sup> Axles	3,500 kg/wheel	2 wheels
3 <sup>rd</sup> & 4 <sup>th</sup> Axles	3,750 kg/wheel	4 wheels

(Refer to diagram A)

(v) In ultimate limit state (ULS) design, the partial safety factor for wheel load including impact effect shall be taken as 1.6. The wheel load shall be assumed to be uniformly distributed over a circular contact area, assuming an effective pressure of 1.1 N/mm<sup>2</sup>.

- (vi) *Alternatively, jack and stabiliser loads for the hardstanding may be rationalised to the following load cases if a more comprehensive and efficient design is desired. The net vehicle load for each load case is maintained at 44 tonnes:*
- Rationalised jack and stabiliser loads and load factor*

*Case 1*

<i>Front jack</i>	<i>15,000 kg/jack</i>
<i>Rear jack</i>	<i>Nil</i>
<i>Stabiliser</i>	<i>7,000 kg/jack</i>

*Case 2*

<i>Front jack</i>	<i>Nil</i>
<i>Rear jack</i>	<i>17,340 kg/jack</i>
<i>Stabiliser</i>	<i>4,660 kg/jack</i>

*Cases 3 to 6*

*(on the same side)*

<i>One front jack</i>	<i>15,000 kg</i>
<i>One rear jack</i>	<i>17,340 kg</i>
<i>One stabiliser</i>	<i>10,000 kg</i>

*(on the opposing side)*

<i>One front jack</i>	<i>1,660 kg</i>
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*or*

<i>One rear jack</i>	<i>1,660 kg</i>
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*In ULS design, the partial safety factor for this rationalised jack load shall be taken as 1.40.*

- (vii) *The jack load shall be assumed to be uniformly distributed over a circular contact area of 500mm diameter for both local and global analysis.*
- (viii) *In the absence of more exact calculations, live load surcharge for accessway or hardstanding on suitable material properly consolidated may be assumed to be at least 10 kN/m<sup>2</sup>.*
- Live load surcharge*