

**SINGAPORE CIVIL DEFENCE FORCE
FIRE SAFETY & SHELTER DEPARTMENT
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Please quote our ref. no. in all future correspondences

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

Dear Sir/Mdm,

PERMISSIBLE VARIATIONS FOR HOUSEHOLD SHELTER (HS) TECHNICAL REQUIREMENTS

A review has been conducted by SCDF and BCA on the technical requirements for household shelter, to establish permissible variations for HS technical requirements. Permissible variations are allowable alternative designs to compensate for shortfall in meeting HS technical requirements without compromising protective requirements. This is to allow for greater flexibility in the design of HS.

2 The permissible variations for HS technical requirements are stipulated in **Annex A**. Adoption of these permissible variations in accordance with the conditions for acceptance is deemed as compliance with the stipulated clauses of the HS technical requirements and hence, no waiver applications will be required in such cases.

3 The permissible variations shall take immediate effect. We would appreciate it if you could disseminate the contents of this circular to members of your Institution or Association.



A PROUD MEMBER OF THE HOME TEAM



4 Please contact undersigned at 68481470 or Maj Cheok Poh Chin at 68481406, should you require further clarifications.

Yours faithfully,

CPT LEE GEOK SENG RAYMOND
SSO SHELTER DEVELOPMENT
FOR COMMISSIONER, SINGAPORE CIVIL DEFENCE FORCE

cc

Members of FSSD Standing Committee

President, SISV

CEO, HDB
Attn: Mr Lau Joo Ming

CEO, URA

CEO, BCA
Attn: Deputy CEO (Building Control)
Director (Special Functions)
Senior Manager (CDSD)
Senior Engineer (CDSD)



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Permissible Variations To Household Shelter Technical Requirements

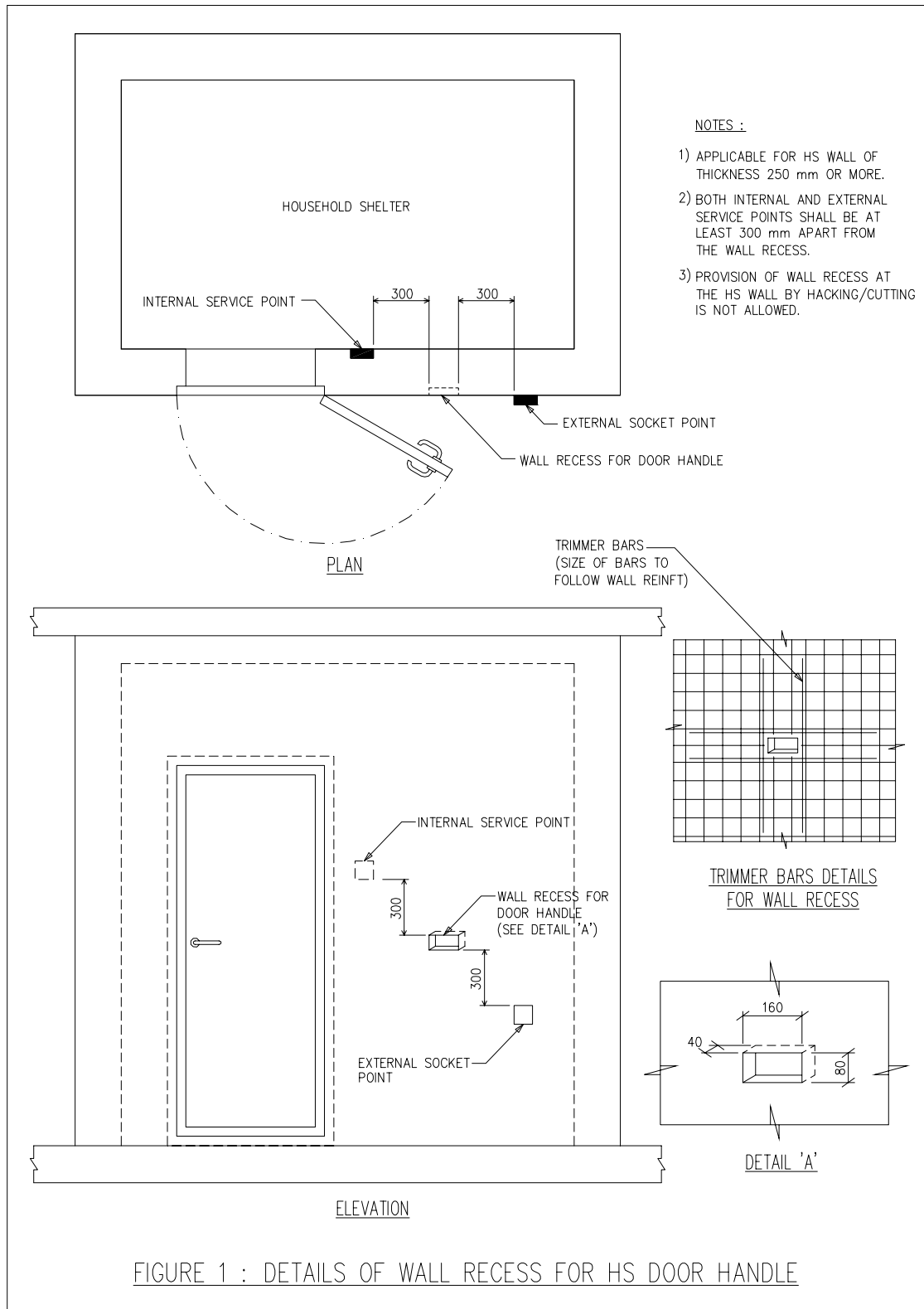
S/No	Clause stipulated in Technical Requirements for HS 2001	Design Issue	Conditions for Acceptance
1	<p>Clause 3.5.4 Cast-In-Situ HS elements shall comply with the dimensions and detailed requirements as shown in Figure 3.5.4 (g).</p>	<p>To accommodate the protrusion of the HS door handle when the HS door is in fully opened position. This is to allow the HS door to be fully opened and in line with the HS wall.</p>	<ul style="list-style-type: none"> a. Provision of a 160 mm (length) x 80 mm (height) x 40 mm (depth) recess to accommodate the HS door handle for HS wall of minimum 250 mm in thickness. (See Figure 1). b. The spacing between the HS door handle recess and external socket point shall be at least 300mm apart. c. The spacing between the HS door handle recess and internal service point shall be at least 300 mm apart. d. No reinforcement bars would be exposed, so as not to affect the structural integrity of the affected HS wall.
2	<p>Clause 3.5.4 Pre-cast HS elements shall comply with the dimensions and detailed requirements as shown in Figure 3.5.4 (k) – HS wall with pre-cast HS door frame panel (Type 1).</p>	<p>For pre-cast door frame panel, a minimum of 300mm concrete wall with 250mm length of starter bar in loop shape extending <u>parallel</u> to the concrete wall is required.</p>	<ul style="list-style-type: none"> a. The alternative design for use of starter bar in a loop shape extending <u>perpendicular</u> to the wall is allowed for pre-cast construction. (See Figure 2a and Figure 2b - HS wall with pre-cast HS door frame panel (Type 3)) b. The reinforcement shall be as given in Table 1 :

Permissible Variations To Household Shelter Technical Requirements

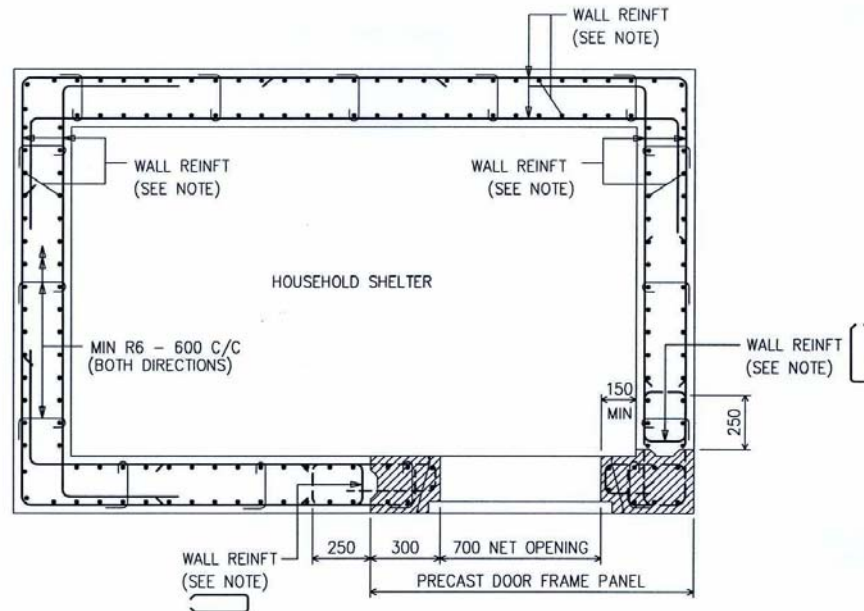
S/N	Development Type	HS Clear Height (mm)	Reinforcement At Both Internal & External Faces of Wall (Both Directions)	Shear Links (Both Directions)
1	Landed	$2400 \leq HT \leq 3900$	T10 – 100	R6 – 600
2	Non-Landed	$2400 \leq HT \leq 2700$	T10 – 100	R6 – 600
		$2700 < HT \leq 3900$	T13 – 100	

Table 1 : Details of wall reinforcement for different development types.

Permissible Variations To Household Shelter Technical Requirements



Permissible Variations To Household Shelter Technical Requirements



NOTE :
WALL REINFORCEMENT SHALL BE :

DEVELOPMENT TYPE	HS CLEAR HEIGHT (mm)	REINFORCEMENT AT BOTH INTERNAL & EXTERNAL FACES OF WALL (BOTH DIRECTIONS)	SHEAR LINKS (BOTH DIRECTIONS)
LANDED	2400mm < HT < 3900mm	T10 - 100	R6 - 600
NON-LANDED	2400mm < HT < 2700mm	T10 - 100	R6 - 600
	2700mm < HT < 3900mm	T13 - 100	

TENSION LAP LENGTH AND TENSION ANCHORAGE LENGTH TO BE 37 TIMES THE DIAMETER OF THE REINFORCEMENT FOR CONCRETE GRADE = 30 N/mm² (CP65 1999)

FIGURE 2a : PLAN OF PRECAST HS DOOR FRAME PANEL (TYPE 3)

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