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GL-21: Scissor Stairs

1. Purpose

Scissor stair configurations, while space-efficient, can present significant challenges during emergency situations. **Alternative stair designs should be considered wherever possible to enhance safety and operational efficiency.**

Where alternative configurations are not practicable, this guideline outlines strategies to mitigate the inherent risks associated with scissor stairs in accordance with the Fire and Emergency Services Commissioner's Operational Requirements, ensuring both safe egress for occupants and effective access for emergency responders.

2. Background

DFES has identified a trend where scissor stairs are used in multi-storey building designs due to their ability to provide two independent egress paths within a single compact stairwell.

Their adoption is often driven by the need to meet the National Construction Code requirements for multiple means of egress while conserving space. However, real-world incidents and operational feedback have revealed several challenges associated with their use during emergencies. These include potential occupant disorientation and complications for firefighting and evacuation operations.

3. Description

Scissor stairs are a type of stair configuration featuring two interlocking flights arranged in a crisscross pattern within a shared shaft or structural riser. Each flight typically serves alternate floors, with access points typically located at opposite ends of the stairwell. Figure 1 shows a section through a typical scissor stair.

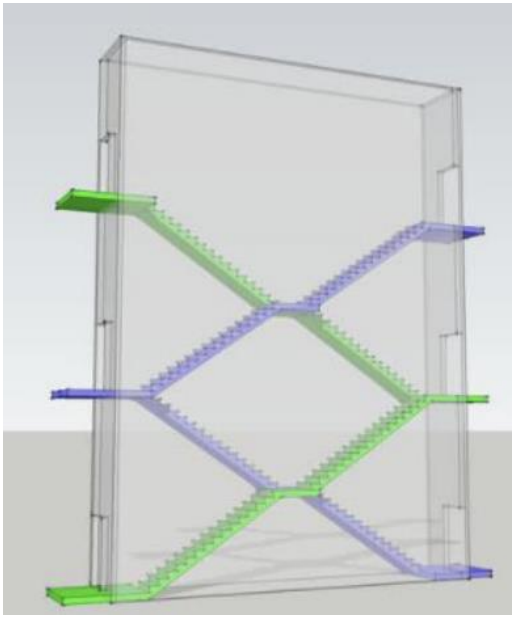


Figure 1: Example of scissor stair layout

4. Risks and Challenges

The unique design of scissor stairs can create challenges during emergencies. Key risks include:

- **Firefighter Navigation and Tactical Access**

The intertwined layout of scissor stairs can make it difficult for firefighters to quickly identify the correct stair for safe and effective access to the fire or their team. Misjudging the stair can delay intervention and complicate hose deployment or team coordination.

- **Directing Occupants to a Safe Stair**

In an emergency, one of the two interwoven stair flights may be affected by smoke, water, and/or active firefighting operations. Without clear guidance, occupants may unknowingly enter the compromised stair. The criss-crossing layout makes it difficult to direct people to the safe, tenable stair unless clear signage and communication systems are in place.

- **Smoke and Heat Spread**

Even though the stairs are enclosed, their close proximity can allow smoke or heat to move between them if the building's pressurisation or fire separation isn't provided or working properly.

- **Exit Bottlenecks**

If both stair flights lead to the same exit point, evacuation flow can be restricted. If that exit becomes blocked, people may lose access to both escape routes. This not only affects occupant safety but can also delay firefighter intervention if no other access routes are available.

- **Inspection and Maintenance Challenges**

The complex layout of scissor stairs can make regular checks harder, increasing the risk of missed safety issues or non-compliance.

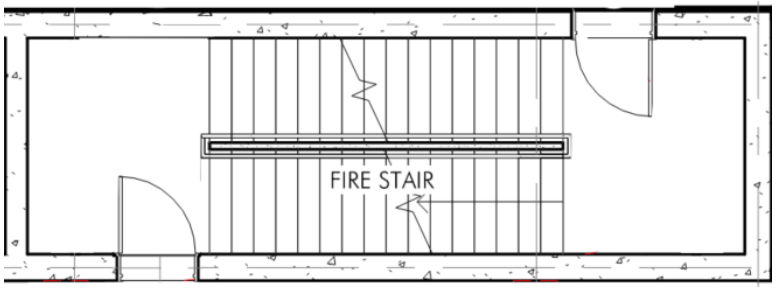
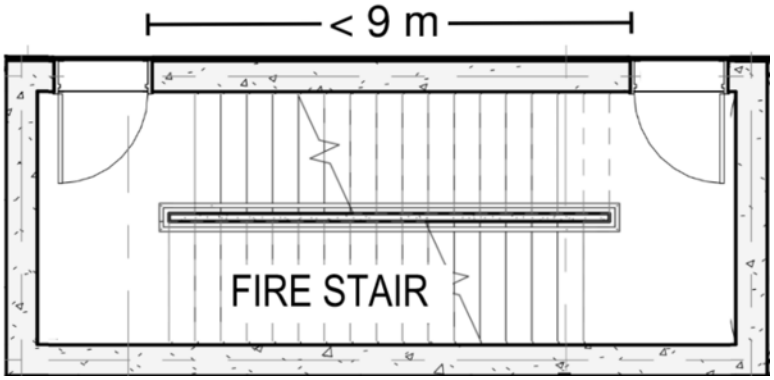
5. Design and Mitigation Strategies

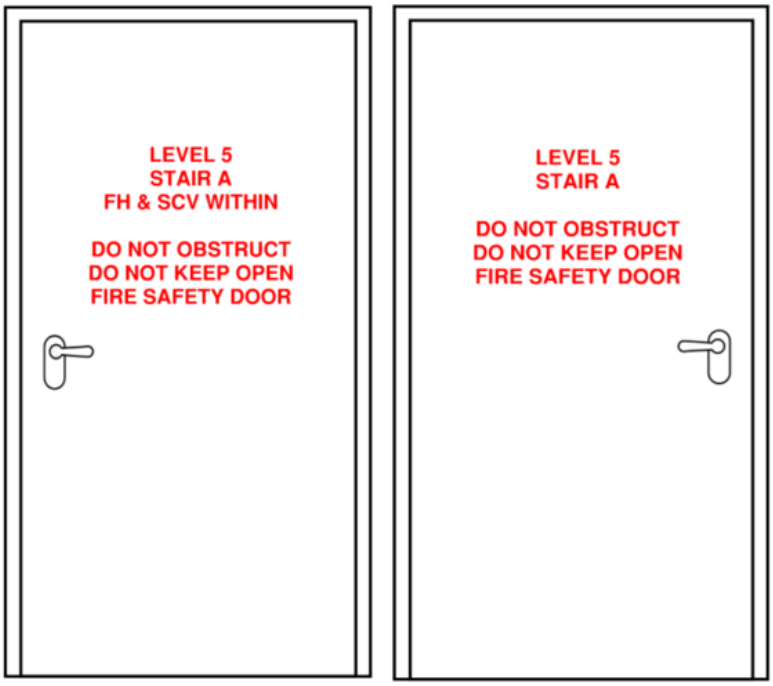
Early engagement with the Built Environment Branch (BEB) is essential when proposing scissor stairs in multi-storey buildings. This ensures that all safety considerations are addressed, allowing both occupants and firefighters to navigate the stairs as safely and efficiently as possible during an emergency.

To address the risks associated with scissor stair configurations, it is recommended that the design team consider the potential issues outlined in this guideline and a project fire safety engineer be engaged early in the design process to assess the suitability of scissor stairs for the specific building type and occupancy.

The table below outlines key design considerations for integrating scissor stairs into building design.

Table 1 Design recommendations

General Layout and Configuration	**Entry points** to each stair on the same level should be positioned **as far apart as possible** (Figure 2). Ideally, occupants should be able to access the alternative stair without passing the door of the compromised stair (Figure 3).  ***Figure 2: Scissor Stair with Entry Points at Opposing Sides of the Stair Shaft***  ***Figure 3: Scissor Stair Entry Points at the Same Side of the Stair Shaft***
	Each stair flight should be **enclosed and separated by fire-rated construction** in accordance with the NCC.
	Sprinkler control valves located within fire-isolated stairwells should be accessible from a single stair entry point, without requiring movement between stair flights. For example, valves may be installed on alternating landings at every other level to ensure ease of access.
Egress and Discharge	The **convergence of exits** into a single discharge point should be avoided, as it may create a bottleneck that compromises egress and potentially delays fire brigade intervention.

	Each stairwell should **discharge either directly to the outside of the building or into a separate fire-isolated passageway**, ensuring redundant escape routes for occupants and improved access for emergency services.
	Smoke-proof lobbies or pressurisation systems are recommended to help **limit smoke migration** between stair flights.
Labelling and Plan Coordination	In addition to complying with NCC Clause D3D28, **each stair** should have a **clear and consistent identification system** applied **across all floors**. Stair signage should indicate the **stair's name** (e.g. Stair A, Stair B), using lettering **at least 20 mm high**. The signage colour should provide a **strong contrast** with the background or door surface to ensure optimal readability. **External (outside) side of the scissor stair fire door:** The presence of internal fire hydrant and sprinkler valve (where applicable) should also be indicated on every level. Refer to Figure 4 for details. **Internal (inside) stair side of the scissor stair fire door:** The stair's name and corresponding floor level should be clearly identified. Refer to Figure 5 for details.  ***Figure 4 (left): Example of Scissor Stair Fire Door Labelling - Outside Stair.*** ***Figure 5 (right): Example of Scissor Stair Fire Door Labelling - Inside Stair.*** In addition to naming each stair, implementing a **colour-coding system** could be beneficial. Colours may be applied to stair doors, within stairwells, or at other key locations to support wayfinding and identification.
	The **naming convention** adopted for the building should be **applied consistently throughout all stages** of the design process and maintained post-construction to ensure clarity and continuity across

	documentation, operations, and future modifications.
	A **location plan** must be provided at each level within the stairwell, in accordance with AS2419.1 clause 11.6, using the adopted stairs identification system.
	Emergency evacuation plans must be developed in accordance with AS3745 and should incorporate stair identification to assist in directing occupants to alternative stairs or egress routes.
	Foor plans and stairwell layouts must be provided in the fire control room and at key access points.
Testing and Maintenance	Scheduled **inspection and maintenance** program/s should be implemented to ensure stairwell integrity, lighting, signage, and pressurisation systems remain functional.
	Regular **evacuation drills** that include scissor stair scenarios should be conducted to familiarise building's occupants.

6. Conclusion

Scissor stairs present a unique set of challenges that require particular attention during design, construction, and emergency planning. This guideline aims to raise awareness of these risks and provide practical strategies to support safer outcomes.

Please note that DFES BEB will assess each submission on its individual merits. This guideline is intended as a key reference to support building design teams in preparing compliant and well-considered proposals.

7. References

- FES Commissioner's Operational Guidelines
- National Construction Code (NCC) 2022 Volume One, Australian Building Codes Board
- *AS 2419.1:2021 Fire Hydrant Installations – System Design, Installation and Commissioning*, Standards Australia
- Australian Standard AS 2118.1 *Automatic fire sprinkler systems — General systems*
- Australian Standard AS 3745-2010 *Planning for emergencies in facilities*
- Australian Standard AS 1851 *Maintenance of Fire Protection Systems*

8. Legislation

- Building Act 2011
- Building Regulations 2012

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Contact us

Department of Fire and Emergency Services
Built Environment Branch
Level 3, 1 Preston Street, Como WA 6152

Email: bebadmin@dfes.wa.gov.au
Web: www.dfes.wa.gov.au