SINGAPORE CIVIL DEFENCE FORCE

Date : 1 Sep 2022 **Our Ref**: CD/04/05/01/01

Registrar, Board of Architects
Registrar, Professional Engineers Board
President, Singapore Institute of Architects
President, Institution of Engineers, Singapore
President, Association of Consulting Engineers, Singapore

Dear Sir/Mdm,

PUBLICATION OF THE CODE OF PRACTICE FOR FIRE PRECAUTIONS IN RAPID TRANSIT SYSTEMS (CPFPRTS) 2022 EDITION

The Review Committee of the CPFPRTS has recently completed the review of this Code and is pleased to announce the release of its 2022 edition. The amendments which were deliberated on and accepted by the CPFPRTS Review Committee are attached as Annex A, Annex B & Annex C of this circular.

2. The review of this Code with the intent to improve the clarity of requirements and to keep up-to-date with new building products, materials and construction methods was led by SCDF and comprised representatives from the building industry, statutory board and professional bodies.

3. Amendments stipulated in this Annexes shall take effect from the dates specified therein. For those amendments that are to take effect at future dates as specified in Annex A & Annex B, Qualified Persons are encouraged to comply with the requirements before the effective dates. Any proposed plans of fire safety works for new stations or addition/alteration works to existing stations that are submitted to SCDF for approval on or after the effective date shall be subjected to the amendments made in this new Code. Notwithstanding the above, SCDF has no objection to the adoption of the new Code with immediate effect by the industry. The electronic version can be viewed on our website at www.scdf.gov.sg.

HQ SINGAPORE CIVIL DEFENCE FORCE, 91 UBI AVENUE 4, SINGAPORE 408827
TEL: 68481467 FAX: 68481490 EMAIL:TAN_Chung_Yee@scdf.gov.sg

4. Please convey the contents of this circular to members of your Board/ Institution/ Association. This circular is also available in CORENET's e-Info: http://www.corenet.gov.sg/einfo.

5. For general queries, you may contact Mr Randy Tan at DID: 68481461 or MAJ Izwan at DID: 68481413.

Yours faithfully

(transmitted via email)

LTC Tan Chung Yee
for Commissioner
Singapore Civil Defence Force

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Annex A

S/N	Amendment Date	Effective Date	Clause Status	Clause Before Amendment	Clause After Amendment
1	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.1.4.45* Habitable height Habitable height is the height measured from the average level of the ground adjoining the outside of the external walls of the station to the finished floor level of the highest habitable floor.	*Cl.1.4.49* Habitable height "Habitable height" ~~is the~~ refers to the height measured from the ~~average~~ level of ~~the ground adjoining the outside of the external walls of the station~~ fire engine accessways or fire engine access roads, whichever is the lowest, to the finished floor level of the highest habitable floor.
2	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.1.4.47* Train-peak load Train-peak load is defined as the full seating capacity plus 4 passengers/m^2 at the available standing area and shall be taken as follows: a. 88 passengers - 1 car length LRT train b. 176 passengers - 2 car length LRT train c. 670 passengers - 3 car length MRT train d. 890 passengers - 4 car length MRT train e. 1340 passengers - 6 car length MRT train	*Cl.1.4.83* Train-peak load ~~Train-peak load is defined as the full seating capacity plus 4 passengers/m^2 at the available standing area and shall be taken as follows:~~ ~~a. 88 passengers - 1 car length LRT train~~ ~~b. 176 passengers - 2 car length LRT train~~ ~~c. 670 passengers - 3 car length MRT train~~ ~~d. 890 passengers - 4 car length MRT train~~ ~~e. 1340 passengers - 6 car length MRT train~~ "Train-peak load" refers to the full seating and standing capacities that a train can carry, specified in *Table 1.4.83*.
3	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.5.1.6* Under-platform service ducts (UPSD) and cable chambers not exceeding 2m from floor to ceiling height need not be considered as a basement storey (as defined in *Cl.1.4.9*) for purposes of determining fire lift provision. The UPSD shall not contain mechanical and electrical equipment other than those serving the space itself. The cable chambers shall only house cables and services linking the two ends of the station.	*Cl.1.4.12* Basement storey …… …… …… a. Under-Platform Services Ducts (UPSD) and cable chambers conforming with *Cl.2.2.4e.* and not exceeding 2m measured from finished floor level

					to ceiling height ~~need~~ shall not be considered as a basement in a transit station ~~basement storey (as defined in *Cl.1.4.9*) for purposes of determining fire lift provision~~. The UPSD and cable chambers shall only house cables and services ~~linking the two ends of the station~~ serving the station. b. ……
4	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.1.5.7* Commercial spaces Additional commercial spaces shall be permitted in stations provided these commercial spaces are located on a separate level other than the platform and concourse levels, and comply with the relevant requirements in this Code.	*Cl.3.2.4c.(3)* Exception (a) Additional commercial spaces shall be permitted in stations, provided these commercial spaces are located on a separate level other than the platform and concourse levels~~,~~ and comply with the relevant requirements in ~~this code~~ the Code of Practice for Fire Precautions in Buildings. Fire separation is required only at the periphery around the large commercial space as shown in *Diagram 3.2.4c.*. (b) …….
5	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.2.5.12b.* Escalators shall not account for more than 50% of the exit capacity at any one level.	*Cl.2.2.3c.(2)* Escalators (a) Escalators not fire-separated from the public floor area shall be considered as contributing to the means of escape capacity. (b) Escalators shall not account for more than 50% of the exit capacity at any one level, including the concourse levels and mezzanine levels

					Exception: Levels consisting only landings that connect escalators and stairs. See *Diagram 2.2.3c.(2)(b).* (c) ……
6	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.2.3.4* There shall be sufficient exit capacity to evacuate the platform occupant load from the station platform in 4 mins or less. See *Appendix A*.	*Cl.2.2.3d.* Platform evacuation There shall be sufficient exit capacity to evacuate the platform occupant load from the station platform in 4 mins or less. See ~~*Appendix A*~~ *Annex 2A*.
7	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.2.3.5* The station shall be designed to permit evacuation from the most remote point of the platform to any one of the following in 6 mins or less. (See *Appendix A*). a. A point of safety b. The safe zone of the concourse level, which is defined as follows: (1) beyond the fare gates; and (2) has sufficient exit capacity to evacuate people from the concourse to the external such that there is no waiting time along the egress routes. c. For stations with shared concourse and platform levels, the safe zones are defined as entrances to subways from concourse unpaid area or the foot of the escalators/staircases at the concourse level leading to the upper levels. Smoke barriers shall be placed either	*Cl.2.2.3e.* Evacuation to safety The station shall be designed to permit evacuation from the most remote point of the platform to any one of the following in 6 mins or less. ~~(See *Appendix A*).~~ See *Annex 2A*. (1) A point of safety (2) For stations with separated concourse and platform levels ~~The safe zone of the concourse level, which is defined as follows:~~ Beyond the fare gates (unpaid areas) at the concourse level which is provided with sufficient exit capacity to evacuate people to the external ~~such that there is no~~ smoothly without any waiting time along the egress routes. (3) For stations with shared concourse and platform levels ~~the safe zones are defined as~~

				at the entrances to subways or at the foot of the escalator stairs at the concourse level leading to upper levels, whichever is applicable. Stations with interchange-link stations connected to non-transit occupancies shall comply with the relevant requirements of *Chapter 8*.	Beyond the entrances to subways from concourse unpaid area or the foot of the escalators/ staircases at the concourse level leading to the upper levels, with smoke barriers ~~shall be~~ placed either at the entrances to subways or at the foots of the escalator stairs at the concourse level leading to upper levels, whichever is applicable. Stations with interchange-link and stations connected to non-transit occupancies shall comply with the relevant requirements of ~~*Chapter 8*~~ *Chapter 9*.
8	1 Sep 2022	1 Mar 2023	Revised/ Clarification	*Cl.2.5.13l.* Electrically locked doors in means of escape path Where electrically locked doors are located in the required means of escape path, (1) The doors shall be unlocked: (a) upon activation of the station's fire alarm; (b) in the event of loss of power to the lock; and (c) upon activation of a manually operated switch by authorized personnel manning the Passenger Service Centre or, in the absence of which, at the OCC, After unlocking, the lock shall be designed to be reactivated only at the manual control switch, and where activated by the station's fire alarm, after the station's fire alarm has been reset.	*Cl.2.2.17l.* ~~Electrically locked doors in means of escape path~~ Access control using smart card locking device, electromagnetic/ electromechanical locking device ~~Where electrically locked doors are located in the required means of escape path,~~ ~~(1) The doors shall be unlocked:~~ ~~(a) upon activation of the station's fire alarm;~~ ~~(b) in the event of loss of power to the lock; and~~ ~~(c) upon activation of a manually operated switch by authorized personnel manning the Passenger Service Centre or, in the absence of which, at the OCC,~~ ~~After unlocking, the lock shall be designed to be reactivated only at the manual control switch, and where activated by the station's~~

				Exception: Doors to equipment rooms not forming part of the means of escape for the public shall not be unlocked by activation of the station's fire alarm and the manually operated switch in PSC/OCC. (2) A break-glass manual release device (a) shall be installed 1.2m vertically above the floor and within 1.5m of the exit door jamb on the egress side, and (b) when operated, shall result in direct interruption of power to the lock independent of the control system electronics, and (3) Signage with shape, dimension, colour scheme, lettering style and lettering sizes complying with SS 508 shall be installed (a) On the egress side of doors reading "Emergency Exit. Door will automatically unlock in case of fire/emergency", and (b) On the break-glass manual release device reading "EMERGENCY DOOR RELEASE".	~~fire alarm, after the station's fire alarm has been reset.~~ ~~Exception: Doors to equipment rooms not forming part of the means of escape for the public shall not be unlocked by activation of the station's fire alarm and the manually operated switch in PSC/OCC.~~ ~~(2) A break-glass manual release device~~ ~~(a) shall be installed 1.2m vertically above the floor and within 1.5m of the exit door jamb on the egress side, and~~ ~~(b) when operated, shall result in direct interruption of power to the lock independent of the control system electronics, and~~ (1) The doors shall be unlocked in the event of a loss of power to the lock. (2) Where access control using electromagnetic/ electromechanical locking device is installed on any exit access door and/ or exit door, such doors shall comply with the requirements stipulated in *Table 2.2.17l.(2) - 1 & 2*.
9	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.3.1* Scope and Purpose The purpose of this Chapter is to stipulate requirements to minimise the risk of spread of fire between adjoining stations/buildings by separation, prevent the untimely collapse of stations in the event of fire by the provision of a stable and durable form of construction and	*Cl.3.1* ~~Scope and Purpose~~ General The purpose of this Chapter is to stipulate requirements to minimise the risk of spread of fire between ~~adjoining stations/buildings~~ the station and adjoining buildings by separation, prevent the untimely collapse of stations in the event of fire by

				prevent the spread of fire between specified parts of the stations by the division of such stations into compartments.	the provision of a stable and durable form of construction and prevent the spread of fire between specified parts of the stations by the division of such stations into compartments.
10	1 Sep 2022	1 Mar 2023	Revised/ Clarification	*Cl.3.2.2* Cubical extent for compartment exceeding 4m in height In computing the cubical extent of compartments in shops and similar premises, a height of 4m can be used where the actual height exceeds that figure, provided that this rule for measurement shall not be applied when a compartment comprises more than one storey or contains mezzanine or galleries.	*Cl.3.2.2* Cubical extent for compartment ~~exceeding 4m in height~~ a. Compartment exceeding 4m in height In computing the cubical extent of compartments ~~in shops and similar premises, a height of 4m can~~, the height of 4m shall be used where the actual height exceeds that figure~~, provided that this rule for measurement shall not be applied when a compartment comprises more than one storey or contains mezzanine or galleries~~. If any compartment contains mezzanine, galleries or lofts, the full height of the compartment shall be used in computing the cubical extent.
11	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.3.2.4d.* Ancillary areas located beneath and within 3m of the trainway For aboveground stations, commercial spaces and ancillary areas located beneath and within 3m of the trainway shall be compartmentalised from the viaduct and its supporting structure by a fire resistance construction of not less than 2 hrs. If sprinkler protection is provided, the fire resistance rating can be reduced to at least 1 hr.	*Cl.3.2.4d.* ~~Ancillary areas located beneath and within 3m of the trainway~~ Separation between viaduct and M&E plantrooms/ commercial spaces For aboveground stations, ~~commercial spaces and ancillary areas located beneath and within 3m of the trainway~~ M&E plantrooms and commercial spaces located directly beneath and within 3m of the viaduct shall be compartmentalised from the viaduct by a fire resistance construction of not less than 2-hrs. If sprinkler protection is provided, the fire resistance rating can be reduced to at least 1-hr.

				Exception: Office, Passenger Service Centre, station master room and ticketing machine rooms located beneath and within 3m of the trainway shall only have a fire-rated roof with a fire resistance rating of not less than 2 hrs. If sprinkler protection is provided, the fire resistance rating can be reduced to at least 1 hr.	~~Exception: Office, Passenger Service Centre, station master room and ticketing machine rooms located beneath and within 3m of the trainway shall only have a fire-rated roof with a fire resistance rating of not less than 2 hrs. If sprinkler protection is provided, the fire resistance rating can be reduced to at least 1 hr.~~
12	1 Sep 2022	1 Mar 2023	Revised/ Clarification	*Cl.3.3.6* Fire-rated board for steel structure Fire-rated boards are permitted to be used for protection to structural steel beams, columns, and wall construction in station if all the following are complied with: a. The fire-rated boards shall be non-combustible (BS 476: Part 4); b. It shall have a fire resistance rating at least equal to that of elements of structure required under *Table 3.4A*; and c. It shall meet the criteria, in terms of water absorption and bending strength performance, when subject to test of BS 1230 Pt 1 (for gypsum plaster board) or ISO 1896 (for calcium silicate or cement board); and	*Cl.3.3.6* Fire-rated board for steel structure Fire-rated boards are permitted to be used for protection to structural steel beams, columns, and wall construction in station if all the following are complied with: a. The fire-rated boards shall be non-combustible (BS 476: Part 4 or Part 11); b. It shall have a fire resistance rating at least equal to that of elements of structure required under *Table 3.4A*; and c. It shall meet the criteria, in terms of water absorption and bending strength performance, when subject to test of ~~BS 1230 Pt 1~~ BS EN 520 (for gypsum plaster board) or ISO 1896 (for calcium silicate or cement board); and
13	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.3.8.9b.* Omission of self-closing devices Where protected shafts are interrupted by barriers with fire resistance of at least ½ hr at every floor level, fire resisting doors opening into the	*Cl.3.8.9c.* ~~Omission of~~ Self-closing devices ~~Where protected shafts are interrupted by barriers with fire resistance of at least ½ hr at every floor level, fire resisting doors opening into the protected~~

				protected shaft are not required to be installed with automatic self-closing devices, provided such doors are kept closed and locked at all times.	~~shaft are not required to be installed with automatic self-closing devices, provided such doors are kept closed and locked at all times.~~ Automatic self-closing devices are not required to be installed on fire resisting doors opening into protected shafts which are interrupted by at least ½-hr fire resistance cavity barriers at every floor level, or protected shafts containing sanitary pipes or water pipes, provided that the fire resisting doors are kept closed and locked at all times.
14	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.3.9.2* Fire doors Fire doors for protection of openings shall comply with the following: a. Fire doors shall have the appropriate fire resistance as required by relevant parts of the Code, and two fire doors may be fitted in an opening if each door by itself is capable of closing the opening and the two doors together achieve the required level of fire resistance. b. … c. … d. Use of fire shutter not exceeding 6m in width shall be permitted. e. Any fire door fitted in an opening which is provided as a means of escape:	*Cl.3.9.2* Fire doors Fire doors for protection of openings shall comply with the following: a. Fire doors shall have the appropriate fire resistance as required by relevant parts of the Code. ~~and~~ A two-leaf door can ~~may~~ be fitted in an opening if each door leaf by itself is capable of closing the opening and the two-leaf door together achieve the required level of fire resistance. b. … c. … ~~d. Use of fire shutter not exceeding 6m in width shall be permitted.~~ d. Any fire door fitted in an opening which is provided as a means of escape:

				(1) Shall be capable of being opened manually, and (2) Shall not be held open by any means other than by an electromagnetic or electromechanical device which can be activated by the presence of smoke and/or the fire alarm system, provided that this shall not apply in the case of fire doors opening into pressurised exit staircases, and (3) Shall open in the direction of exit travel in accordance with *Cl.2.5.13d.* f. Fire resisting doors where required to be provided shall be constructed and installed to comply with specifications stipulated under SS 332 Specification for Fire Doors and SS 489 Specification for Fire Shutters. g. Fire shutters shall not be used as security shutters. h. The inactive leaf of double-leaf doors for plant/equipment/machine rooms and for lobby/ corridor leading to these rooms, where the inactive leaf is only for use as equipment access, need not be fitted with a self-closing device, but must be bolted in place and fitted with a sign "Keep door bolted".	(1) Shall be capable of being opened manually, and (2) Shall not be held open by any means other than by an electromagnetic or electromechanical device which can be activated by the presence of smoke and/or the fire alarm system, provided that this shall not apply in the case of fire doors opening into pressurised exit staircases, and (3) Shall open in the direction of exit travel in accordance with *Cl.2.5.13d.* e. Fire resisting doors where required to be provided shall be constructed and installed to comply with specifications stipulated under SS 332 Specification for Fire Doors and SS 489 Specification for Fire Shutters. ~~g. Fire shutters shall not be used as security shutters.~~ f. The inactive leaf of double-leaf doors for plant/equipment/machine rooms and for lobby/ corridor leading to these rooms, where the inactive leaf is only for use as equipment access, need not be fitted with a self-closing device, but ~~must~~ shall be bolted in place and fitted with a sign "Keep door bolted".
15	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.4.2.3* Firefighting/ exit staircase	*Cl.4.2.3* Firefighting~~/ exit~~ staircase

				a. At least one exit staircase shall be designated as a firefighting /exit staircase provided for every underground station. b. The entrance to firefighting/ exit staircase on the ground level shall be visible and within 18m from a fire engine access road. c. Firefighting/ exit staircase shall have access to every basement storey via fire lift lobbies. d. Firefighting/ exit staircase shall not be used for any other purposes and the size of the fire lift lobby shall be at least 6m² and with no dimension smaller than 2m. Where the fire lift lobby has a fire lift provided under Cl.5.7.5c., the floor shall be graded from the lift door towards the lobby door with a fall not exceeding 1 in 200.	b. At least one exit staircase shall be designated as a firefighting~~/ exit~~ staircase provided for every underground station. c. The entrance to firefighting~~/ exit~~ staircase on the ground level shall be visible and within 18m from a fire engine access road. d. Firefighting~~/ exit~~ staircase shall have access to every basement storey via smoke-free lobby/ fire lift lobbies. e. ~~Firefighting/ exit staircase shall not be used for any other purposes and~~ The size of the smoke-free lobby/ fire lift lobby adjacent to a firefighting staircase and/ or fire lift lobby shall be at least 6m^2 and with ~~no dimension smaller than~~ minimum clear width of 2m. ~~Where the fire lift lobby has a fire lift provided under Cl.5.7.5c.,~~ The floor shall be graded from the lift door towards the lobby door with a fall not exceeding 1 in 200.
16	1 Sep 2022	1 Mar 2023	Revised/ Clarification	*Cl.4.4.2* Water supply for private fire hydrant Provision of water supply shall comply with one of the following requirements: a. Private fire hydrant installed at reduced level 125m and below can receive direct supply from public water mains provided: (1) The nominal bore of the hydrant pipe and the bulk water meter shall be at least 150mm in diameter; and	*Cl.4.4.2* Water supply for private fire hydrant ~~Provision of water supply shall comply with one of the following requirements:~~ The provision of water supply for a private fire hydrant system, where required by this Code, shall comply with the following requirements: a. Private fire hydrant installed at ~~reduced level 125m and~~ or below reduced level 125m~~ can receive direct supply from public water mains provided~~:

				(2) The running pressure/flow at the hydraulically most unfavourable hydrant of the private fire hydrant system shall comply with the following: (a) Running pressure > 0.9 x (running pressure of the nearest public hydrant - pressure drop across the bulk water metre); and (b) Flow Rate > 0.9 x water flow of the nearest public hydrant or > total flow demand (as required in) of the private hydrant system, provided the running pressure at the remotest private hydrant is greater than 2 bars. Note: • In calculating the frictional loss of the private fire hydrant system, the design flow rates shown in *Table 4.4A* shall be used. • Pressure drop across bulk water metre shall not be more than 1 bar. b. Dry private fire hydrant above reduced level 125m (1) Where there is only one private hydrant in the plot that is located above reduced level 125m; and	(1) Private fire hydrants installed at reduced level 125m and below can receive direct supply from public water mains provided the flow and pressure from the public water mains meet the fire hydrant requirements as shown in *Table 4.4.2*, or the following requirements are complied with: (a) the AFA of the largest compartment shall not exceed 1000m^2; (b) the nominal bore of the fire hydrant pipe and the bulk water meter shall not be less than 150mm in diameter; and (c) the running pressure/ flow at the hydraulically most unfavourable fire hydrant of the private fire hydrant system shall comply with the following: (i) running pressure >= 0.9 x (running pressure of the nearest public fire hydrant – pressure drop across the bulk water metre); and (ii) flow rate >= 0.9 x water flow of the nearest public fire hydrant or >= total flow demand (as required in *Table 4.4.2*) of the private fire hydrant system, provided the running pressure at the most remote private fire hydrant is greater than 2 bars.

				(2) this hydrant is not the sole hydrant within 50m from any breeching inlet(s) feeding into fixed water based firefighting system(s) including automatic sprinkler systems and dry riser systems for the station standing on this plot of land; then this hydrant can be in the form of a "dry" hydrant. A "dry" hydrant shall be connected to a 150mm diameter dry pipe, which shall be connected at the other end to a four-way breeching inlet. This breeching inlet shall be within 18m from any fire engine accessible way and within 50m from any wet hydrant, private or public. c. ……..	Note: In calculating the frictional loss for the private fire hydrant system, the design flow rates shown in *Table 4.4.2* shall be used. The pressure drops across bulk water metre shall not be more than 1 bar. (2) If the requirements stipulated in *Cl.4.4.2a.(1)* cannot be met, a storage tank of sufficient capacity meeting the flow rate and duration as specified in *Table 4.4.2* with the requisite pumping facilities shall be provided. b. ~~Dry~~ Private fire hydrant above reduced level 125m (1) ~~Where there is only one private hydrant in the plot that is located above reduced level 125m; and~~ Where more than one private fire hydrant is located above reduced level 125m within the same plot, storage and pumping arrangements of water supply to these specified fire hydrants shall comply with the requirements stipulated in *Cl.4.4.2c.*. (2) ~~this hydrant is not the sole hydrant within 50m from any breeching inlet(s) feeding into fixed water based firefighting system(s) including automatic sprinkler systems and dry riser systems for the station standing on this plot of land;~~ The private fire hydrant can be in the form of a dry fire hydrant, if it is not the sole fire hydrant within 50m from any breeching inlet(s) feeding firefighting

					systems for the station(s) within the plot of land, which include: (a) automatic fire sprinkler systems, or (b) dry riser systems. (3) A dry fire hydrant shall comply with all of the following requirements: (a) A dry private fire hydrant shall be connected to a 150mm diameter dry pipe, which shall be connected at the other end to a four-way breeching inlet. (b) This breeching inlet shall be within 18m from any fire engine accessway/ fire engine access road having minimum 4m width and within 50m from any wet fire hydrant, private or public. (c) The private dry pillar shall be painted in "yellow" and labelled "dry" on the fire hydrant pillar. (d) A signage indicating the location of breeching inlet shall be positioned next to the dry private fire hydrant. ~~then this hydrant can be in the form of a "dry" hydrant. A "dry" hydrant shall be connected to a 150mm diameter dry pipe, which shall be connected at the other end to a four-way breeching inlet. This breeching inlet shall be within 18m from any fire engine accessible way~~

					~~and within 50m from any wet hydrant, private or public.~~ c. …….
17	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.5.1.1* Air shafts Air shafts (as defined in Cl.6.1.4) need not be provided with manual call points, alarm bells, detectors, sprinklers, fire extinguishers or hose reels. *Cl.5.2.1* Provision Fire extinguishers shall be provided within the station, commercial spaces and plant rooms at ground level entrances. Pedestrian underground or aboveground links leading to station entrances and services ducts need not be provided with fire extinguishers.	*Cl.6.1.2* Provision a. Fire extinguishers shall be provided within the station, commercial spaces, and plant rooms at ground level entrances~~. Pedestrian underground or aboveground links leading to station entrances and services ducts need not be provided with fire extinguishers~~. except the following: (1) pedestrian underground/aboveground link leading to station entrances; (2) under-platform services ducts and cable chambers; and (3) air shafts;
18	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.5.3.5d.* Landing valve, where provided at the centre of train platform shall be charged with water when any one of the dry rising mains at the ends of the platform is charged with water.	*Cl.6.2.2b.(2)(d)* Landing valve, where provided at the ~~centre of the train~~ station platform public area shall be charged with water when any one of the dry rising mains at the ends of the platform is charged with water.
19	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.5.2.2f.* For fire detection in station public areas, linear heat detectors of the optic fibre type and optical beam line-type detectors can be considered in the concealed ceiling spaces and under the ceilings respectively. Where linear heat	*Cl.6.3.1b.(4)* For fire detection in the station's back of house electrical rooms, service duct/ cable duct/ under-platform, associated cable basement and concealed ceiling spaces of public areas, linear heat detectors of the optic fibre type ~~and optical beam line-type detectors can be considered in the~~

				detectors are used, the coverage shall be equivalent to the point-type detectors.	~~concealed ceiling spaces and under the ceilings respectively.~~ are allowed. Where linear heat detectors are used, the coverage shall be equivalent to the point-type detectors. For fire detection under the ceilings of station public areas, optical beam line-type detectors are allowed.
20	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.5.5.2a.* For underground station without FCC, the main alarm panel shall be located in the exit/ firefighting staircase at ground level. All fire alarm signals shall also be transmitted to the PSC, if required.	*Cl.6.3.2c.* For underground station without FCC, the main alarm panel shall be located in the ~~exit/~~ firefighting staircase at ground level. All fire alarm signals shall also be transmitted to the PSC, if required.
21	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.5.6.2* Installation of the sprinkler system and its associated water supply, control and testing requirements shall comply with SS CP 52 Code of Practice for Automatic Fire Sprinkler System. a. Hazard groups for the sprinkler design shall be as follows: (1) Ordinary Hazard 1 for ancillary areas; and (2) Ordinary Hazard 3 for commercial spaces. b. Sprinkler pipes passing through the public areas and under-platform services ducts need not be enclosed within fire rated enclosures; and c. Tunnel Ventilation Fan room and Smoke Control Fan rooms which also serve as	*Cl.6.4.2* Standard Installation of the sprinkler system and its associated water supply, control and testing requirements shall comply with the SS CP 52 ~~Code of Practice for Automatic Fire Sprinkler System~~. a. Hazard groups for the sprinkler design shall be as follows: (1) Ordinary Hazard 1 for ancillary areas; and (2) Ordinary Hazard 3 for commercial spaces. b. Sprinkler pipes passing through the public areas and under-platform services ducts need not be enclosed within fire rated enclosures. c. Tunnel Ventilation Fan room and Smoke Control Fan rooms which also serve as smoke plenums shall be protected by detectors.

				smoke plenums shall be protected by detectors. d. Cut-off sprinklers are not required above exit doors of staircases and exit passageways if the exit doors are located in the station public areas. e. Magnetic (short circuit) trips are permitted for use in motor circuits of electric motor driven pumps. f. The sprinkler control valves and ancillary equipment shall be located in the fire pump / tank room. g. The flexible tube of metal construction and braided are permitted for connection to individual sprinklers and to rigid pipework above suspended ceiling and shall be of approved/listed type.	~~d. Cut-off sprinklers are not required above exit doors of staircases and exit passageways if the exit doors are located in the station public areas~~ d. Magnetic (short circuit) trips are permitted for use in motor circuits of electric motor driven pumps. e. The sprinkler control valves and ancillary equipment shall be located in the fire pump/ tank room. f. The flexible tube of metal construction and braided are permitted for connection to individual sprinklers and to rigid pipework above suspended ceiling and shall be of approved/ listed type. g. Sprinklers installed in lift shafts and lift motor rooms shall be protected by stout metal guards and shall have a temperature rating of not less than 68°C.
22	1 Sep 2022	1 Mar 2023	Revised/ Clarification	*Cl.5.7.5* Fire lift a. Underground stations where the depth between basement 1 finished floor level to the lowest storey finished floor level (cable chamber/under-platform is not considered a storey) exceeds 9m shall be provided with at least one fire lift. b. The fire lift shall be contained within a separate protected shaft or a common protected shaft containing other lifts subject	*Cl.6.6.6* Fire lift a. General (1) The installation of the fire lift shall be in accordance with SS 550. (2) All aboveground stations shall be provided with at least two fire lifts if the habitable height exceeds 24m.

				to such other lifts being served at each storey by a fire lift lobby. Basement 1 can be considered as designated firefighters entry floor if the proposed fire lift cannot be extended directly to grade without transfers. For such design, all 'at-grade' entrances with passenger lifts leading to basement 1 shall double up for use by firefighters and be fitted with fire lift switches and emergency supplies. c. A fire lift shall be located such that the travel distance between the nearest edge of the lift landing door and exit staircase door is not more than 5m and the exit staircase shall be approached through a fire lift lobby at every storey, including first storey. The fire lift shaft shall be continuous throughout the building and serve every storey except non-habitable roof as defined under *Cl.1.4.44*. d. The fire lift operational features shall be provided and activated via a fire lift switch in accordance with SS 550. e. A lift mainly intended for the transport of goods shall not be designated as a fire lift. Cargo lift shall not open into a fire lift lobby.	(3) For underground stations where the depth between basement 1 finished floor level to the lowest storey finished floor level (cable chamber/ under-platform is not considered a storey) exceeds 9m shall be provided with at least one fire lift. All passenger lifts to double up as secondary fire lift for use by firefighters and be fitted with fire lift switches and emergency supplies. (4) The fire lift shall be contained within a separate protected shaft or a common protected shaft containing other lifts subject to such other lifts being served at each storey by a fire lift lobby. Basement 1 can be considered as designated firefighters entry floor if the proposed fire lift cannot be extended directly to grade without transfers. ~~For such design, all 'at-grade' entrances with passenger lifts leading to basement 1 shall double up for use by firefighters and be fitted with fire lift switches and emergency supplies~~. Secondary fire lift need not be contained within a separate protected shaft and being served at each storey by a fire lift lobby. (5) The fire lift shaft shall be continuous throughout the ~~building and serve every storey except non-habitable roof as defined under *Cl.1.4.44.*~~ station and serve every storey except a non-habitable roof. The fire lift operational features shall be provided and activated via a fire lift switch in accordance with SS 550 except all

					secondary fire lifts serving from grade level to all public areas. (6) A lift mainly intended for the transport of goods shall not be designated as a fire lift. Cargo lift shall not open into a fire lift lobby. (7) The fire lift car shall have a platform area of at least 1.45m^2. Where a fire lift serves the dual purpose of an evacuation lift for PWDs, it shall have a clear car platform area of minimum 1.2m by 1.4m. b. Accessibility and coverage (1) A fire lift shall be located such that the travel distance between the nearest edges of the lift landing door and exit staircase door is not more than 5m. In addition, the exit staircase shall be approached through a fire lift lobby at each storey, including first storey. (2) Regardless of whether the station is installed with an automatic sprinkler system, the number of fire lifts required shall be such that any part of a storey of the station is within 60m coverage from the fire lift door, subject to the provision of at least two fire lifts in accordance with *Cl.6.6.6a.(4)*, except for underground stations. c. Fire lift switch

<table>
<tr><td></td><td></td><td></td><td></td><td></td><td>A fire lift switch shall be provided at both the designated and alternate designated floors.</td></tr>
<tr><td rowspan="2">23</td><td rowspan="2">1 Sep 2022</td><td rowspan="2">1 Mar 2023</td><td rowspan="2">Revised/ Clarification</td><td>Cl.6.1.4 Air shafts

Fresh/ exhaust air of the station’s smoke control and mechanical ventilation systems can be taken from/discharge to the intake/exhaust air shafts (shown shaded in Diagram 6.1.4 – 1 & 2 below) respectively of the underground station.</td><td>Cl.7.1.16 Air shafts

a. Fresh/ exhaust air of the station’s smoke control and mechanical ventilation systems can be taken from/ discharge to the intake/ exhaust air shafts as shaded in Diagram 7.1.16 – 1 & 2 below respectively of the underground station. The connection to the air shafts shall be designed to prevent recirculation of air to the other ventilation system.

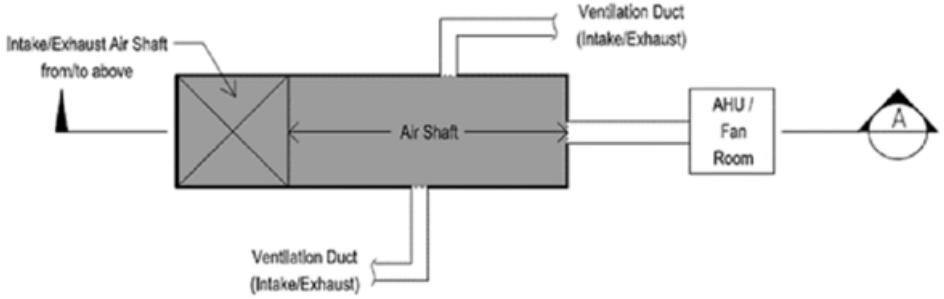
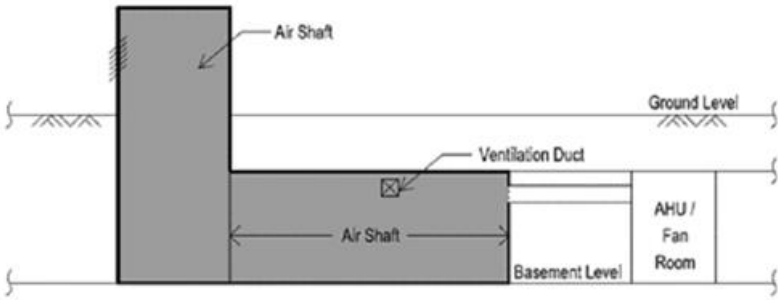
b. Air shafts shall be constructed of masonry and shall only contain equipment and services serving the air shafts and services stated in Table 7.1.16.</td></tr>
<tr><td colspan="2"> 

Diagram 7.1.16 – 1: Air Shaft Plan Layout</td></tr>
</table>

				 Diagram 7.1.16 – 2: Air Shaft Section A-A	
24	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.7.2.1* Provision One and two-way emergency voice communication shall comply with requirements stipulated in SS 546 Code of Practice for Emergency Voice Communication Systems in Buildings. a. Provision of the two-way emergency voice communication system shall only be required for underground station. Locations of remote handsets for two-way emergency voice communication system shall comply with *Cl.7.2.7*. b. The 4-hour backup battery capacity required in SS 546 for the emergency voice communication system can be halved if it is supported by a dual feeder power supply system.	*Cl.8.2.1* Provision One and two-way emergency voice communication shall comply with requirements stipulated in SS 546 ~~Code of Practice for Emergency Voice Communication Systems in Buildings.~~, with the following exceptions. a. Provision of the two-way emergency voice communication system shall only be required for underground station. Locations of remote handsets for two-way emergency voice communication system shall comply with *Cl.7.2.7*. b. The 4-hour backup battery capacity ~~required in SS 546~~ for the emergency voice communication system shall be provided. The backup battery capacity can be halved if it is supported by a dual feeder power supply system.

25	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.9.8.6* Trolley batteries Valve regulated lead acid (sealed type) batteries shall be used for the motorised trolley. Two sets of batteries (one spare) shall be provided for each trolley.	*Cl.9.3.13f.* Trolley batteries ~~Valve regulated lead acid (sealed type) batteries shall be used for the motorised trolley.~~ Two sets of batteries (one spare) shall be provided for each trolley. The trolley with maximum load shall be capable of travelling the distance between stations on one set of fully charged batteries.
26	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.12.2.1* Requirements for facility building Requirements stipulated in the previous sections of this Code for transit stations and trainways are not applicable to the RTS facility buildings. RTS facility buildings e.g. on-line electric sub-station, relay building and other electrical and mechanical installations etc. shall comply fully with the Code of Practice for Fire Precautions in Buildings.	*Cl.9.6.2* Facility buildings a. Requirements for facility buildings Requirements stipulated in the previous sections of this Code for transit stations and trainways are not applicable to the RTS facility buildings. RTS facility buildings e.g. on-line electric sub-station, OCC, relay building, and other electrical and mechanical installations ~~etc.~~ shall comply fully with the Code of Practice for Fire Precautions in Buildings, except as herein modified.
27	1 Sep 2022	1 Sep 2022	Revised/ Clarification	*Cl.13.3.2* Dual electric feeder Notwithstanding the above, dual feeder power supply are deemed to have been provided with primary and secondary source of power supplies. The primary feeder (primary supply) shall be the normal power supply while the secondary feeder (secondary supply) shall be the emergency power supply. (See *Diagram 13.3.2- 1 & 2*)	*Cl.5.2.6* Dual electric feeder power supply ~~Notwithstanding the above, dual feeder power supply are deemed to have been provided with primary and secondary source of power supplies~~. Dual electric feeder power supply is deemed to have been provided with primary and secondary source of power supplies, on condition that the feeders are tapping power supply from different segregated blocks of the power grid. The primary feeder (primary supply) shall be the normal power supply while the secondary feeder (secondary supply) shall

					be the emergency power supply. See *Diagrams 5.2.6 – 1 & 2* below.
28	1 Sep 2022	1 Mar 2023	New	Nil	***Cl.9.8*** **ELECTRICAL TRANSFORMER ROOM IN UNDERGROUND STRUCTURES** *Cl.9.8.1* General This set of fire safety requirements is applicable to electrical distribution transformer room located within underground RTS structures. *Cl.9.8.2* General requirements a. Compartment size and depth limits (1) The AFA of transformer room shall not exceed 100m^2. (2) The transformer room shall be located not lower than platform level. b. The transformer oil shall be tested to ASTM D92 or ISO 2592 standard and with the fire point exceeding 300ºC c. The underground structure housing the transformer shall not be sited within 15m of an exit staircase shaft. d. Provision to contain spillage of transformer insulating liquid shall be provided. e. Firefighting systems

					(1) Automatic fire alarm system (a) An automatic fire alarm system shall be provided for the electrical transformer room. (b) The fire alarm system for the underground transformer room shall be a dedicated zone, linked to the building fire alarm system. A summary fire alarm status (alarm/ fault) shall be provided to the main fire alarm panel in the building development. (2) Fire suppression system Automatic fire suppression system such as automatic sprinklers, foam-water sprinklers or water mist shall be provided for the electrical transformer room.
29	1 Sep 2022	1 Sep 2022	Revised/ Clarification	Nil *Note: Existing train peak load requirements found in Cl.1.4.77*	See *Annex C*: *TABLE 1.4.83*
30	1 Sep 2022	1 Mar 2023	New	Nil	See *Annex C*: *TABLE 2.2.17l.(2) - 1*: PRE-REQUISITES FOR USE OF ELECTROMAGNETIC/ ELECTROMECHANICAL LOCKING DEVICE
31	1 Sep 2022	1 Mar 2023	New	Nil	See *Annex C*: *TABLE 2.2.17l.(2) - 2*: DE-ENERGISE REQUIREMENTS FOR

					ELECTROMAGNETIC/ ELECTROMECHANICAL LOCKING DEVICE
32	1 Sep 2022	1 Mar 2023	Revised/ Clarification	Existing *Table 4.4A*	See *Annex C*: *Table 4.4.2* WATER SUPPLY & STORAGE REQUIREMENT FOR PRIVATE FIRE HYDRANT
33	1 Sep 2022	1 Sep 2022	Revised/ Clarification	Existing *Diagram 4.2.4e.(3) - 3*	See *Annex C*: Revised *Diagram 4.2.4j.(3)*
34	1 Sep 2022	1 Sep 2022	Revised/ Clarification	Existing *Diagrams 5.2.6 – 1 & 2*	See *Annex C*: Revised *Diagram 5.2.6 – 1 & Diagram 5.2.6 - 2*
35	1 Sep 2022	1 Mar 2023	Revised/ Clarification	Existing *Table 5.6A*	See *Annex C*: (affected portions of *Table 6.4A*)
36	1 Sep 2022	1 Mar 2023	New	Nil	See *Annex C*: *Table 7.1.16*: TYPES OF PERMITTED SERVICES ROUTED IN AIR SHAFTS

Annex B

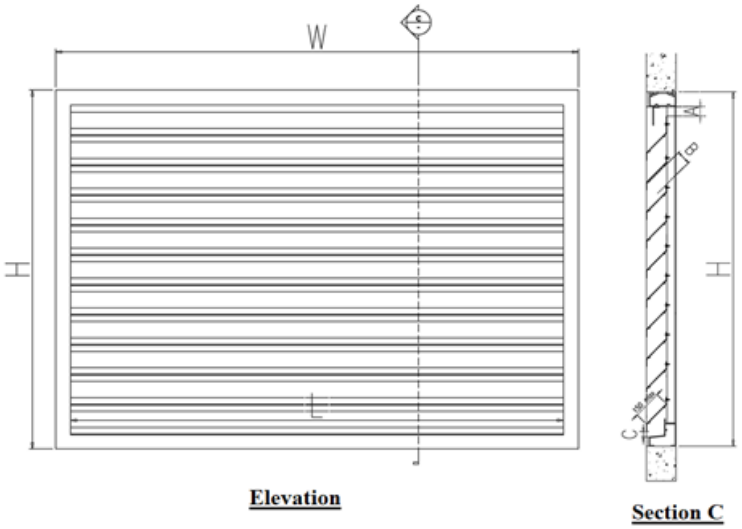
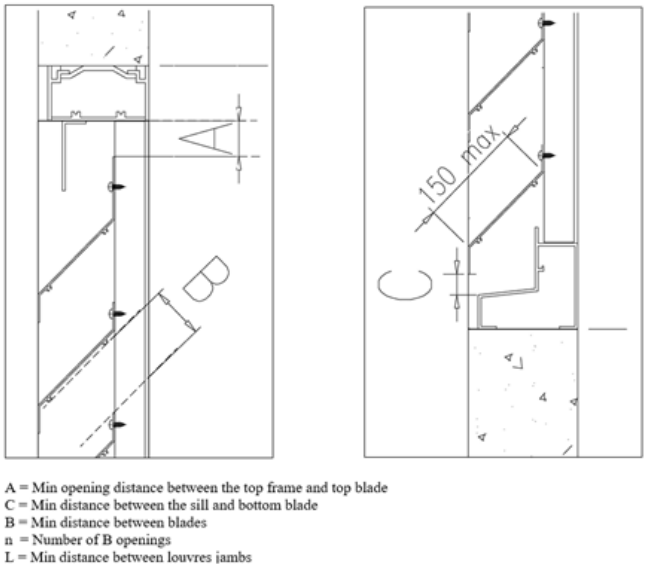
S/N	Amendment Date	Effective Date	Clause Status	Clause Before Amendment	Clause After Amendment
1	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.1.1.3* Energy Storage System Fire safety requirements for Energy Storage System shall be in accordance with the Code of Practice for Fire Precautions in Buildings, except where herein modified in this Code.
2	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.1.1.4* Solar Photo-Voltaic (PV) installation Fire safety requirements for solar photo-voltaic (PV) installation shall be in accordance with the Code of Practice for Fire Precautions in Buildings, except where herein modified in this Code.
3	1 Sep 2022	1 Mar 2023	Existing from Fire Code	Nil	*Cl.1.1.5* Fire Safety Report *(Appendix 1)* Fire Safety Report for station projects/ fire safety provisions specified by SCDF shall be submitted when making building plan submission.
4	1 Sep 2022	1 Mar 2023	Existing from Fire Code	Nil	*Cl.1.1.6* Fire Safety Instruction Manual *(Appendix 2)* a. Fire Safety Instruction Manual for station projects/ fire safety provisions specified by SCDF shall be submitted when making application for Temporary Fire Permit or Fire Safety Certificate b. The station owner shall keep and maintain the Fire Safety Instruction Manual at all times and present to the Qualified Person (QP) upon

					request. Where any Addition & Alteration works are carried out to the stations, the station owner shall ensure that changes in the management of fire safety provisions are updated in the Fire Safety Instruction Manual by the QP. The updated Fire Safety Instruction Manual shall be submitted to SCDF for record.
5	1 Sep 2022	1 Mar 2023	Existing from Fire Code	Nil	*Cl.1.4.1* Accessible floor area "Accessible floor area" refers to the total floor area of all covered spaces within a station, including service ducts, lift shafts, toilets, staircases, areas occupied by fixed/ moveable furniture/ equipment/ facilities, and any open-to-sky habitable areas above or below the first storey of the station.
6	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Cl.1.4.6 Area of refuge a. An area of refuge refers to an area adequately separated from the rest of the station by fire resisting construction (see Chapter 3 for details). Evacuees from the rest of the station can enter the area of refuge via an external corridor which links to the rest of the station. An area of refuge can serve as a required exit in lieu of the provisions given under *Cl.1.4.29*. b. An area of refuge can also be an area in an adjoining station that is separated from the station under consideration by fire resisting construction. Evacuees similarly enter this area of refuge via an external corridor.	*Cl.1.4.6* Area of refuge ~~a. An area of refuge refers to an area adequately separated from the rest of the station by fire resisting construction (see Chapter 3 for details). Evacuees from the rest of the station can enter the area of refuge via an external corridor which links to the rest of the station. An area of refuge can serve as a required exit in lieu of the provisions given under *Cl.1.4.29*.~~ ~~b. An area of refuge can also be an area in an adjoining station that is separated from the station under consideration by fire resisting construction. Evacuees similarly enter this area of refuge via an external corridor.~~ ~~c. An area of refuge shall always be accessible.~~

				c. An area of refuge shall always be accessible.	"Area of refuge" refers to an area within a station or in an adjoining station where evacuees can temporarily take refuge, in lieu of the requirement for adequate exit staircase provision. It shall be adequately separated from the rest of the station or adjoining station by fire-resisting construction and connected via an external corridor or open-sided linkway. The area of refuge shall be always accessible.
7	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.1.4.10* Authority having jurisdiction "Authority having jurisdiction" refers to non-SCDF local entities, which may include an organisation, office, or individual responsible for enforcing the requirement of a code, standard, or for approving equipment, materials, an installation, or a procedure.
8	1 Sep 2022	1 Mar 2023	Existing from Fire Code	Nil	*Cl.1.4.27* Electromagnetic or Electromechanical locking device "Electromagnetic" or "Electromechanical locking device" refers to a fail-safe device which provides egress access control. In the event of a fire alarm activation, failure of power supply, and/ or any fault in the locking devices/ components, related to the release of locking mechanism, this device shall: a. automatically unlock doors immediately to facilitate egress and remain so until power supply is restored; and b. be provided with a means of manual override located within the occupied space, 1.2m above the floor, and within 1.5m of the door jamb.

9	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	*Cl.1.4.35* External cladding External cladding refers to material fixed to the outside face of an external wall for weather protection or decorative purpose.	*1.4.41* External ~~cladding~~ wall finishes ~~External cladding refers to material fixed to the outside face of an external wall for weather protection or decorative purpose.~~ "External wall finishes" refers to materials/ components installed on the station facade for the purpose of providing thermal insulation, weather resistance and/ or to improve the appearance of stations. They can be made of metal, brick/ stone granite, composite materials, etc. It shall include cladding, fins, and any decorative features mounted on the external walls of a station.
10	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.1.4.55* Mechanical ventilation "Mechanical ventilation" refers to any system that uses mechanical means such as ventilation fan, to introduce outdoor air to a space when natural ventilation mode cannot be achieved during normal and fire emergency situations. This includes supply ventilation, exhaust ventilation, pressurisation, smoke purging, mechanical engineered smoke control systems, balanced systems that consist of both supply and exhaust ventilations, etc.
11	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.1.4.60* Occupant load "Occupant load" to a station, or part thereof, refers to the total number of persons that can occupy such a station, or part thereof, at any one time. The "occupant load" shall be determined via the floor area(s) available for occupant based on the appropriate areas per person as stated in *Table*

					1.4.60.
12	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.1.4.66* Pressurisation "Pressurisation" refers to a mechanical ventilation system that introduce positive differential pressure to a space/room to prevent smoke ingress during a fire emergency.
13	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	*Cl.1.4.66* Relevant authority Relevant authority refers to the Commissioner of Singapore Civil Defence Force and includes officers authorized by him generally or specifically to exercise the powers, functions and duties conferred by the Fire Safety Act.	*Cl.1.4.77* ~~Relevant authority~~ Singapore Civil Defence Force (SCDF) ~~Relevant authority refers to the Commissioner of Singapore Civil Defence Force and includes officers authorized by him generally or specifically to exercise the powers, functions and duties conferred by the Fire Safety Act.~~ "Singapore Civil Defence Force (SCDF)" refers to the Commissioner of Singapore Civil Defence Force and includes officers authorised by him generally or specifically to exercise the powers, functions, and duties conferred by the Fire Safety Act.
14	1 Sep 2022	1 Mar 2023	Existing from Fire Code	Nil	*Cl.1.4.87* Ventilation openings "Ventilation openings" refer to fixed natural ventilation openings located in external walls for any space, which shall be always unobstructed, and exclude windows or louvres that are openable or operable. Where fixed louvres are used in natural ventilation openings for exit staircases, smoke-free lobbies or exit passageways they shall consist of a single bank of louvres with blade width not exceeding 150mm, with effective ventilation openings calculated based on the free area

					calculation stated in *Diagram 1.4.87*.
	Ventilation opening size for single bank louvres = Free Area = L [A + C + (B x n)]  **Elevation** **Section C**  A = Min opening distance between the top frame and top blade C = Min distance between the sill and bottom blade B = Min distance between blades n = Number of B openings L = Min distance between louvres jambs Diagram 1.4.87: Ventilation Opening Size				
15	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	***Cl.2.1* SCOPE AND PURPOSE** The provisions of this chapter shall serve to express the intentions for determining the design, construction, protection, location, arrangement and maintenance of exit facilities to provide safe means of escape for occupants.	***Cl.2.1*** ~~**SCOPE AND PURPOSE**~~ **GENERAL** The provisions of this Chapter shall serve to express the intentions for determining the design, construction, protection, location, arrangement, and maintenance of exit facilities to provide safe means of escape for occupants. Areas which are designated as means of escape such as exit staircase, fire lift lobby, smoke-free lobby, exit passageway, and escape corridor shall not be turned into other usage.

16	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.2.2.5b.* Smoke-free lobby (1) A smoke-free lobby shall be separated from the adjoining areas of the station by a wall having 1-hr fire resistance. (2) The exit access door shall have ½-hr fire resistance fitted with automatic self-closing device conforming to the requirements of Cl.3.9.2. (3) The design of a smoke-free lobby shall be such as not to impede movement of occupants through the escape route. (4) The floor area of a smoke-free lobby shall be at least 3m² and with minimum clear width of 1.2m. If a smoke-free lobby also serves as a fire lift lobby or serve the firefighting staircase, the floor area shall be not smaller than 6m² and with minimum clear width of 2m. (5) The floor shall be graded from the lift door towards the lobby door with a fall not exceeding 1 in 200. (6) A smoke-free lobby, including fire lift lobby, which acts as buffer space for entry into the protected staircase and use by firefighters during emergency, shall be maintained as common property. (7) A smoke-free lobby shall be ventilated through any of the following:

					(a) Permanent fixed ventilation openings which are located in the external wall of the lobby and have a total area of not less than 15% of the floor area of the lobby. Each opening shall not be less than $1m^2$ and shall abut an external space or air well, having a minimum clear area of $93m^2$ and minimum width of 6m and without obstruction vertically throughout the airspace for ventilation. No part of the lobby floor area shall be more than 9m away from the air well or external space. (b) Mechanical ventilation, which complies with the requirements in Chapter 7. (c) Cross-ventilated corridor/ lobby which complies with all the following: (i) The corridor/ lobby shall have fixed ventilation openings abutting an external space. The ventilation openings shall be located on opposite sides of the corridor/ lobby at high level and shall not be less than 50% of the superficial area of the opposing external walls. (ii) No part of the floor area of the corridor/ lobby shall be at a distance of more than 12m from the ventilation openings. (iii) The distance of 12m can be measured along the internal corridor via the intermediate ventilation opening to the

					external space, provided there is no unprotected openings in the walls along the path to the external space. The intermediate ventilation opening shall not be less than 2m in width and 1.2m in height and the width of the path to the external space shall not be less than 2m.
17	1 Sep 2022	1 Mar 2023	Existing from Fire Code	Nil	*Cl.2.2.10c.* Discharge All exit staircases shall discharge at ground level directly into: (1) an external space, or (2) an open-sided external corridor with no commercial activity and is not more than 5m from the station eave line, or (3) an open-to-sky corridor having minimum width of 1.2m and two-way escape paths leading to an external space. Any unprotected openings along the corridor shall not be located lower than 1.8m from the floor level, or (4) In a sprinkler-protected station, a maximum of 50% of the total number of exit staircase can be discharged directly to the ground level covered circulation space provided all the following are complied with: (a) The discharge point of the exit staircase into the ground level circulation space shall be within sight of and with direct

					access to an external space. (b) The maximum distance between the discharge point of an exit staircase and the external space shall not exceed 10m. (c) Where there are commercial activities e.g. shops or kiosks/ carts located along one side or both sides of the designated escape passageway leading to an external space, a minimum separation distance of 10m shall be maintained between the commercial activities and the designated escape passageway. The circulation space shall also be installed with engineered smoke control system. Alternatively, the commercial activities shall be fire compartmented with walls and doors of minimum 1-hr fire resistance rating. (d) The clear width of the exit doors leading to an external space shall be adequate to receive the occupant load in the 1st storey circulation space and the total number of people discharging from the internal exit staircases.
18	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.2.2.10n.* Measurement of width The clear width shall be measured between: (1) the finished surfaces of the walls, if the staircase is enclosed on both sides by walls only, or

					(2) the finished surface of the wall and the inner side of the balustrade, if the staircase has a wall on one side and a balustrade on the other side, or (3) the inner sides of the balustrades if the staircase has balustrades on both sides. Note: The projection of handrail into the clear width of a staircase shall not exceed 80mm on each side of the staircase. If the projection exceeds 80mm, the clear width of the staircase shall be measured from the inner sides of the handrails.
19	1 Sep 2022	1 Mar 2023	Existing from Fire Code	Nil	*Cl.2.2.11* Fire escape plan a. A fire escape plan shall be provided for all station platform and concourse public areas. They shall be located such that they are easily viewable by the occupants passing through these areas which shall include lift lobbies for lift between platform and concourse, ticketing areas at concourse level, firefighting lobbies and fire lift lobbies. The fire escape plan shall have legible lettering and the fire escape routes made clear to the viewer. It shall clearly show the layout of the floor in the correct orientation and highlight the escape routes (in relation to viewer's location), escape corridors and exit staircases using appropriate colours, directional signs and words. The information required on the plan are for firefighting and evacuation purposes and shall include the locations of the following:

					(1) PWD lifts; (2) Hose reels; (3) Fire extinguishers; (4) Emergency fire phones; ~~and~~ (5) Passenger Service Centre; (6) Fire Lifts; (7) Manual alarm call points; and (8) Rising mains b. For ensuring legibility of the fire escape plan for stations with large floor areas, a partial plan of the location where the viewer is standing, showing the escape routes and firefighting provisions located within the area, is acceptable. The plan shall show the egress paths to at least 2 remotely located exits/exit staircases.
20	1 Sep 2022	1 Mar 2023	Existing from Fire Code	*Cl.2.5.13c.* Measurement of door width In determining the egress width of a doorway for the purpose of calculating capacity, only the clear width of the doorway (when the door is fully opened) shall be measured. The measurement of width shall be the clear width between the edge of the door jamb or stop and the surface of the door when kept open at an angle of 90º in the case of a single door. In the case of a double door opening,	*Cl.2.2.17c.* Measurement of door width ~~In determining the egress width of a doorway for the purpose of calculating capacity, only the clear width of the doorway (when the door is fully opened) shall be measured. The measurement of width shall be the clear width between the edge of the door jamb or stop and the surface of the door when kept open at an angle of 90º in the case of a single door. In the case of a double door opening, the measurement of~~

				the measurement of width shall be between the surface of one leaf to the other when both leaves are kept open at an angle of 90º (see *Diagram 2.5.13c.* below), and	~~width shall be between the surface of one leaf to the other when both leaves are kept open at an angle of 90º (see *Diagram 2.5.13c.* below), and~~ (1) In the case of an exit/ exit access door having a single leaf door, the opening shall be measured between the edge of the door jamb and the surface of the door when opened at an angle of 90°. See *Diagram 2.2.17c.(1).* (2) In the case of a 2-leaf exit/ exit access door fitted with an approved automatic flush bolt, the clear openings shall be measured between the surface of one leaf to the other door leaf when opened at an angle of 90°. (3) If one of the door leaves is bolted to the door frame and/ or floor by a manually operated bolt, this door leaf shall not be considered for the purpose of determining the exit capacity of the door. The opening of the other door leaf shall have a clear width of not less than 850mm, measured between the edge of the bolted door leaf and the surface of the other door leaf, when opened at an angle of 90°. (4) Door hardware and handrails which do not protrude more than 80mm into the clear width of exit opening can be disregarded.
21	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	*Cl.3.2.2* Cubical extent for compartment *a.* Compartment exceeding 4m in height ……	*Cl.3.2.2* Cubical extent for compartment *a.* Compartment exceeding 4m in height ……

					b. Open-side covered walkway/ link-bridge Where station is connected to another station or building by external open-sided covered walkway or open-sided covered link-bridge, the station/ building is considered as separate station or building, if they comply with the following conditions: (1) There is no commercial activities or other usage that would pose a fire risk within the covered walkway or link-bridge. (2) The width of the covered walkway or covered link-bridge shall not exceed 6m clear width.
22	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	*Cl.3.7.3* Junction with other structures Where a compartment wall or compartment floor forms a junction with any structure comprising any other compartment wall, or any external wall, separating wall or structure enclosing a protected shaft, such structures shall be bonded together at the junctions, or the junctions shall be fire-stopped to comply with the requirements of *Cl.3.12*.	*Cl.3.7.3 Openings* a. Junction with other structures Where a compartment wall or compartment floor forms a junction with any structure comprising any other compartment wall, or any external wall, separating wall or structure enclosing a protected shaft, such structures shall be bonded together at the junctions, or the junctions shall be fire-stopped to comply with the requirements of *Cl.3.12*. b. Opening in curtain walling The opening occurring at the junction between the edge of a structural floor and the curtain

					walling shall be sealed to prevent the spread of smoke and flame from the lower floor to the upper floor via the opening. Materials to be used for sealing the opening shall have the requisite fire resistance rating as the elements of structure.
23	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.3.7.6* Use of fire shutter a. General A fire shutter is permitted to be used as compartment wall, except for the fire compartmentation of FCC, exit staircases, firefighting staircase, smoke-free lobbies, fire lift lobbies, internal exit passageways, etc. The station shall be separated from the non-transit occupancy by fire-rated shutters having at least 2 hrs fire resistance b. Fire resistance The fire shutters, which are used to protect opening in compartment wall/ floor, shall have the necessary fire resistance including thermal insulation, not less than that of the compartment wall/ floor. However, fire shutters, which are installed at the edge of atria, voids such as escalator void areas and between floors, and door-way, need not have thermal insulation. c. Operation Shutters such as vertical, horizontal, and lateral

					fire shutters shall comply with SS 489 and the following: (1) Vertical fire shutter operated by gravity during a fire Upon activation, the operating mechanism of curtains/ leaves of the vertical fire shutter shall be released. The curtain/ leaves shall descend under gravity at a controlled rate. (2) Electrically-operated vertical, lateral and horizontal fire shutter (fusible link is not required) Upon activation, the electrical motor shall drive the curtains/ leaves to descend and shall be backed up by emergency power supply. The power and signal cables shall be fire-rated (3) Activation time and closing speed (a) For vertical fire shutter with height not exceeding 6m, the maximum time for full closure of the fire shutter shall not exceed 30 secs from time of activation, with a descending speed not exceeding 0.2m/sec. (b) For vertical fire shutter with height exceeding 6m and not more than 12m, the maximum time of full closure of the fire shutter shall not exceed 60 secs from time of activation, with a

					descending speed not exceeding 0.2m/sec.
24	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.3.7.6d.* Mode of activation The mode of activation for fire shutters at different locations shall be as follows: (1) Fire shutters as separating wall between station and non-transit occupancy The localised smoke detector shall be provided on both sides of the fire rated shutter. The fire-rated shutters shall be activated by the: (a) Localised smoke detector(s) on either side (i.e. one side) of these fire shutters, or (b) Adjacent building fire alarm zone(s) in adjacent building. Upon activation of the localised standalone smoke detector, an alarm signal shall be sent to the fire alarm panels of both the station & the adjacent building. Where fire-rated shutters are provided, the fire-rated shutters after closing shall remain closed and be rendered inoperative until the alarm has been reset. This alarm signal is not to be used to trigger the station's or building's fire alarm and only to provide the status that the shutter is activated. The fire-rated shutters can be re-open after the fire alarm signal has been reset.

					(2) Fire shutters as compartment wall/ floor for limiting compartment area and cubical extent Fire shutters as compartment wall/ floor for limiting compartment areas and cubical extent, as compartment between different purpose groups, as compartment of special rooms such as kitchen, electrical room, store room, etc. and as compartment of basement passenger/ goods lift lobby: (a) For gravity-operated vertical fire shutters, activation by fusible link is acceptable. (b) For electrically-operated fire shutters, activation shall be by local smoke detectors. (3) Fire shutters as compartmentation at atrium/ voids or between floors (being part of the engineered smoke control design) Only electrically-operated fire shutters are permitted. The signal to operate the respective fire shutter shall be from a dedicated smoke detector installed at the respective smoke zone.
25	1 Sep 2022	1 Mar 2023	Existing from Fire Code	Nil	*Cl.3.7.7* Fire safety signage for fire shutter and smoke curtain a. Exit directional signage marked with an arrow and the word "EXIT" shall be prominently painted/ pasted on fire shutters/ smoke curtains to redirect station occupants to the nearest exits

					if the activated shutters visually obscure the station exit and/ or directional signs. The sign shall be reflective and the letters at least 100mm in height. b. Signage for alerting persons not to impede the operation of fire shutters/ smoke curtains shall be permanently displayed at prominent locations and suitable intervals close to the descending paths of the fire shutters/ smoke curtains. The lettering of the sign shall be at least 25mm high in a colour contrasting with the background and states the following where applicable: (1) "FIRE SHUTTER – KEEP CLEAR" (2) "SMOKE CURTAIN – KEEP CLEAR"
26	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Cl.3.8.6 Doors in protecting structures Any door fitted to an opening in protecting structure shall have fire resistance for not less than half the period required by other provisions of the Code for the protecting structure surrounding the opening.	*Cl.3.8.6* Doors in protecting structures a. Any door fitted to an opening in protecting structure shall have fire resistance for not less than half the period required by other provisions of the Code for the protecting structure surrounding the opening. b. Any door fitted to an opening in protecting structure of a shaft containing services, such as electrical and telecommunication cables, pipes (including gas pipe in separate shaft), ducts etc., is not required to comply with the requirements in *Cl.2.2.17e.(2)* if it is fitted with a self-closing device. Rising mains and hose reel doors shall not be fitted with self-closing device and shall comply with the stipulated corridor width when

					the door is in its fully opened position. Areas within the swing paths of the rising mains and hose reel doors shall be clear of any obstruction/ storage at all times. c. Exception Any door fitted to an opening in protecting structure of a shaft containing services such as electrical cables, pipes (including gas pipe in separate shaft), ducts, etc., is not required to have the fire resistance rating if the door is located along the wall facing the external corridor.
27	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	*Cl.3.8.7c.* The protecting structure shall be constructed of masonry or drywall. If drywall construction is used, all the following conditions shall be complied with: (1) Drywall shall be non-combustible; and (2) Drywall shall have the requisite fire resistance rating at least equal to that of elements of structure; and (3) Drywall shall meet the criteria, in terms of impact & deflection performance, when subject to the tests of BS 5588 Part 5 Appendix A and BS 5234 part 2; and (4) Drywall shall meet the criteria, in terms of water absorption and bending strength performance, when subject to test of BS 1230 Part 1 (for gypsum plaster board) or ISO	*Cl.3.8.7c.* The protecting structure shall be constructed of masonry or drywall. If drywall construction is used, all of the following conditions shall be complied with: (1) The drywall shall be non-combustible. ~~and~~ (2) The drywall shall have the requisite fire resistance rating at least equal to that of elements of structure; ~~and~~ (3) The drywall shall ~~meet the criteria,~~ in terms of impact & deflection performance~~, when subject to the tests of BS 5588 Part 5 Appendix A and BS 5234 part 2;~~ and to meet the partition grade under BS 9999 (Test for partitions) in accordance with BS 5234-2; (4) The drywall shall meet the criteria, in terms of water absorption and bending strength

				1896 (for calcium silicate or cement board); and (5) There shall have at least two independent exits.	performance, when subject to test of BS 1230 Part 1 (for gypsum plaster board) or ISO 1896 (for calcium silicate or cement board); and (5) The station shall have at least two independent exit staircase shafts (scissors exit staircases are considered single shaft). ~~There shall have at least two independent exits.~~
28	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	*Cl.3.8.8b.* The protecting structure shall be constructed of masonry or drywall. If drywall construction is used, the following conditions shall be complied with: (1) Drywall shall be non-combustible; and (2) Drywall shall have the requisite fire resistance rating at least equal to that of elements of structure; and (3) Drywall shall meet the criteria, in terms of impact and deflection performance, when subject to the tests of BS 5588 Part 5 Appendix A and BS 5234 Part 2; and (4) Drywall shall meet the criteria, in terms of water absorption and bending strength performance, when subject to test of BS 1230 Part 1 (for gypsum plaster board) or ISO 1896 (for calcium silicate or cement board). (5) Drywall shall meet the criteria of Cyclic Loading and Dynamic test as specified under *Cl.3.3* of Building Code of Australia Specification C 1.8.	*Cl.3.8.8b.* The protecting structure shall be constructed of masonry or drywall. If drywall construction is used, the following conditions ~~shall be complied with:~~ stipulated under *Cl.3.8.7c.(1) to (4)* shall be complied with. The drywall shall also meet the criteria of cyclic loading and dynamic test as specified under *Cl.3.3* of National Construction Code of Australia C 1.8. ~~(1) Drywall shall be non-combustible; and~~ ~~(2) Drywall shall have the requisite fire resistance rating at least equal to that of elements of structure; and~~ ~~(3) Drywall shall meet the criteria, in terms of impact and deflection performance, when subject to the tests of BS 5588 Part 5 Appendix A and BS 5234 Part 2; and~~ ~~(4) Drywall shall meet the criteria, in terms of water absorption and bending strength performance, when subject to test of BS 1230 Part 1 (for gypsum plaster board) or ISO 1896 (for calcium silicate or cement board).~~

					~~(5) Drywall shall meet the criteria of Cyclic Loading and Dynamic test as specified under Cl.3.3 of Building Code of Australia Specification C 1.8.~~
29	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	*Cl.3.8.9a.* The protecting structure for protected shaft containing mechanical ventilation ducts serving exit staircases, exit passageways, smoke-stop, and fire lift lobbies which pass through one or more floors shall be constructed of masonry or drywall. Such shaft shall be completely compartmented from the rest of the shaft space containing other ducts or any other services installations. Protected shaft containing ducts serving other areas which pass through two or more floors shall be constructed of drywall. If the protected shaft is of drywall construction, the following conditions shall be complied with: (1) Drywall shall be non-combustible; and (2) Drywall shall have the requisite fire resistance rating at least equal to that of elements of structure; and (3) Drywall shall meet the criteria, in terms of impact and deflection performance, when subject to the tests of BS 5588 Part 5 Appendix A and BS 5234 Part 2; and (4) Drywall shall meet the criteria, in terms of water absorption and bending strength performance, when subject to test of BS 1230 Part 1 (for gypsum plaster board) or ISO 1896 (for calcium silicate or cement board).	*Cl.3.8.9a.* The protecting structure for protected shaft containing mechanical ventilation ducts serving exit staircases, exit passageways, smoke-~~stop~~ free, and fire lift lobbies which pass through one or more floors shall be constructed of masonry or drywall. Such shaft shall be completely compartmented from the rest of the shaft space containing other ducts or any other services installations. ~~The~~ A protected shaft containing ducts serving other areas which pass through ~~two or more~~ floor~~s~~ slabs shall can be constructed of drywall. If the protected shaft is of drywall construction, the ~~following~~ conditions stipulated in *Cl.3.8.7c.* shall be complied with. ~~(1) Drywall shall be non-combustible; and~~ ~~(2) Drywall shall have the requisite fire resistance rating at least equal to that of elements of structure; and~~ ~~(3) Drywall shall meet the criteria, in terms of impact and deflection performance, when subject to the tests of BS 5588 Part 5 Appendix A and BS 5234 Part 2; and~~ ~~(4) Drywall shall meet the criteria, in terms of water absorption and bending strength performance, when subject to test of BS 1230 Part 1 (for gypsum plaster board) or ISO 1896 (for calcium silicate or cement board).~~

30	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.3.8.9b.* Cavity barriers A protected shaft used for the enclosure of electrical power services shall be interrupted at every floor level with at least ½-hr fire resistance cavity barriers. Protected shaft used for the enclosure of telecommunications services shall be interrupted by at least ½-hr fire resistance cavity barriers at vertical intervals not exceeding 15m. The cavity barriers within trunking enclosing electrical and telecommunication cables can be exempted if the following conditions are met: (1) the cables shall be flame retardant type complying with IEC 60332; (2) the floor within the shaft shall be sloped upward with an angle of at least 45° to the floor level; and (3) the fire doors to the protected shaft are installed with self-closing devices.
31	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	*Cl.3.13.3* Classification Class 0 shall be regarded as the highest class followed by Class 1 as set hereunder: a. Class 0 - Surface of no Flame Spread. Those surfaces that conform to the requirements of *Cl.3.13.1*. b. Class 1 - Surface of Very Low Flame Spread. Those surfaces on which not more than	*Cl.3.13.3* Classification Class 0 shall be regarded as the highest class followed by Class 1 as set hereunder: a. Class 0 - Surface of no flame spread. ~~Those~~ Such surfaces ~~that~~ shall conform to the requirements of *Cl.3.13.1*. b. Class 1 - Surface of very low flame spread. This refers to ~~Those~~ surfaces on which ~~not~~

				150mm mean spread of flames occurs under the relevant test conditions.	~~more than 150mm mean spread of flames occurs under the relevant test conditions.~~ during the first 1½ mins of test, the spread of flame does not exceed 165mm and the final spread of flame does not exceed 165mm under the relevant test conditions.
32	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	*Cl.3.14.1* Materials for roof covering and roof construction shall be non-combustible.	*Cl.3.14.1* ~~Materials for roof covering and roof construction shall be non-combustible~~ Roof Construction a. The surface of materials for roof covering and roof construction shall have a surface spread of flame rating not lower than BS Class 1, or Class A when tested in accordance with ASTM E108. b. Composite panel used as roof covering shall comply with the relevant clauses of the Code of Practice for Fire Precautions in Buildings. c. Roof covering containing plastic shall comply with the relevant clauses under *Cl.3.6.3.* and *Cl.3.7.4.* respectively.
33	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	*Cl.4.2.1* General Fire access openings along external walls of elevated stations, firefighting/exit staircase for underground stations, fire engine accessway and fire engine access road shall be provided for firefighting and rescue operations. Exception: Fire access opening and fire engine accessway are not required for single storey aboveground stations.	*Cl.4.2.1* General ~~Fire access openings along external walls of elevated stations, firefighting/exit staircase for underground stations, fire engine accessway and fire engine access road shall be provided for firefighting and rescue operations.~~ ~~Exception: Fire access opening and fire engine accessway are not required for single storey aboveground stations.~~

a. Fire engine accessways/ fire engine access roads shall be provided to ensure site accessibility for firefighting appliances.

b. Fire engine accessways/ fire engine access roads shall have an adequate clear width for the deployment of firefighting appliances, in accordance with the habitable height, as stipulated in *Table 4.2.1*.

c. Fire access openings to compartment or spaces

For aboveground stations exceeding the habitable height of 10m, fire access openings are required at every storey/ level, except the 1st storey, and shall face the fire engine accessway directly.

TABLE 4.2.1: FIRE ENGINE ACCESSWAY/ FIRE ENGINE ACCESS ROAD

Details	Habitable Height (m)		
	≤ 10	> 10 & ≤ 50	> 50
Width of fire engine access road	≥ 4m		
Width of fire engine accessway	Not required	≥ 6m	≥ 7m
Length of fire engine accessway	-	See *Table 4.2.4a.(2)*	
Type of firefighting appliance	Pump ladder	CPL 34 & AL 56	AL 56, CPL 60 & HLA 90
Loading capacity of fire engine road #	≥ 24 tonne	≥ 30 tonne	≥ 50 tonne
Loading capacity of fire engine accessway #	-	≥ 30 tonne	≥ 50 tonne
Axle/Jack loading		See *Table 4.2.4d.(2)-1* & *Table 4.2.4d.(2)-2*	
Turning facility U-turn radii	See *Diagram 4.2.4f.*		

				Note: # The appended figures for loading capacity of fire engine accessway/ fire engine access road are characteristic values.	
34	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.4.2.2d.* Location The fire access openings shall be placed against an occupied space. It shall not be placed at plant/ store room, exit staircase, smoke-free approach to exit staircase or space that leads only to a dead end.
35	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	*Cl.4.2.2e.* Number and position of fire access openings (1) Position Fire access openings shall be spaced at most 20m apart measured along the external wall from centre to centre of the fire access openings. (2) Additional openings For stations with an area or space that has a ceiling height greater than 10m, high level access openings for smoke venting and firefighting purposes shall be provided and located in the external walls opening into the area or space.	*Cl.4.2.2e.* Number and position of fire access openings (1) ~~Position~~ Number of fire access openings ~~Fire access openings shall be spaced at most 20m apart measured along the external wall from centre to centre of the fire access openings.~~Every 20m of fire engine accessway or part thereof shall be provided with an access opening. (2) ~~Additional openings~~ Position of fire access openings ~~For stations with an area or space that has a ceiling height greater than 10m, high level access openings for smoke venting and firefighting purposes shall be provided and located in the external walls opening into the area or space~~. Fire access openings shall be remote from each other and located along the

					side of the station. Such fire access openings shall be spaced at most 20m apart measured along the external wall from centre to centre of the fire access openings. The fire access openings shall be distributed such that there is at least one opening at every 20m of the fire engine accessway. (3) Additional openings for ventilation For an area or space has a ceiling height greater than 10m, additional high level ventilation openings for smoke venting and firefighting purposes shall be provided and located in the external walls opening into the area or space. The ventilation opening shall meet the following criteria: (a) the number and location of the openings shall comply with *Cl.4.2.2e.(1) and Cl.4.2.2e.(2);* (b) the dimensions of the openings shall comply with *Cl.4.2.2c.;* (c) the openings can be in the form of openable panels/ louvres, breakable glazing, or permanent openings; and (d) the openings shall not be indicated with the triangular signage as mentioned under Cl.4.2.2b., but instead be labelled with red wording, “DO NOT ENTER – FOR SMOKE VENTING ONLY”, of height not less than 50mm and visible from the station

					exterior.
36	1 Sep 2022	1 Mar 2023	Existing from Fire Code	*Cl.4.2.4* Fire engine accessway for firefighting appliances a. Fire engine accessway shall be provided for accessibility of site to firefighting appliances. To permit firefighting appliances to be deployed, the fire engine accessway shall have a minimum width of 6m throughout its entire length. Fire access openings shall be provided along the external walls of station fronting the fire engine accessway to provide access into the station for firefighting and rescue operations. b. For stations not exceeding the habitable height of 10m, fire engine accessway will not be required. However, provision of fire engine access road having minimum 4m width for pump appliances will be required to within a travel distance of 45m of every point on the projected plan area of the station. c. For stations exceeding the habitable height of 10m, fire engine accessway shall be located directly below the fire access openings to provide direct outreach to the fire access openings. Fire engine accessway shall be provided based on the gross floor area (including toilets, stores, circulation spaces, etc.) of the largest floor as shown in *Table 4.2A*	*Cl.4.2.4* Fire engine accessway ~~for firefighting appliances~~ and fire engine access road a. Aboveground stations ~~Fire engine accessway shall be provided for accessibility of site to firefighting appliances. To permit firefighting appliances to be deployed, the fire engine accessway shall have a minimum width of 6m throughout its entire length. Fire access openings shall be provided along the external walls of station fronting the fire engine accessway to provide access into the station for firefighting and rescue operations.~~ (1) For stations not exceeding the habitable height of 10m, fire engine accessway is not required. However, ~~provision of fire engine access road having minimum 4m width for pump~~ a fire engine access road for firefighting appliances ~~will~~ shall be provided to within a travel distance of 45m of every point on the projected plan area of the station. (2) For stations exceeding the habitable height of 10m, fire engine accessway shall be located directly below the fire access openings to provide direct reach to the designated fire access openings. ~~Fire engine accessway shall be provided based on the gross floor area (including toilets, stores, circulation spaces, etc.) of the~~

					~~largest floor as shown in *Table 4.2A*.~~ The required length of fire engine accessway shall be computed based on the largest AFA as shown in *Table 4.2.4a.(2)*. (a) For stations with interconnected floors, including basements connected to aboveground floors, the AFA shall be the aggregate AFA of all the interconnected floors. (b) For stations with more than one group of interconnected floors, the AFA shall be taken as the largest of the aggregate floor areas among the groups of interconnected floors. (3) Open-sided covered link bridge/ linkway used for station evacuation shall be included in the station AFA computation, measured up to 6m from the start of link bridge/ linkway. There shall not be any commercial activities or other usage that would pose a fire risk within the link bridge/ linkway.

<table>
<tr><td></td><td></td><td></td><td></td><td colspan="2">
<table>
<tr><th colspan="3">TABLE 4.2.4a.(2): LENGTH OF FIRE ENGINE ACCESSWAY</th></tr>
<tr><td rowspan="2">AFA (m^2)</td><td colspan="2">Required length of perimeter</td></tr>
<tr><td>Non-sprinkler-protected</td><td>Sprinkler-protected*</td></tr>
<tr><td>≤ 2000</td><td>$^1/_6$ (at least 15m)</td><td rowspan="2">$^1/_6$ (at least 15m)</td></tr>
<tr><td>> 2000 and ≤ 4000</td><td>¼</td></tr>
<tr><td>> 4000 and ≤ 8000</td><td>½</td><td>¼</td></tr>
<tr><td>> 8000 and ≤ 16000</td><td>¾</td><td>½</td></tr>
<tr><td>> 16000 and ≤ 32000</td><td rowspan="2">island site</td><td>¾</td></tr>
<tr><td>> 32000</td><td>island site</td></tr>
<tr><td colspan="3">Note:

* Station that comply with Cl.6.4.1 is deemed as sprinkler-protected</td></tr>
</table>
</td></tr>
<tr><td>37</td><td>1 Sep 2022</td><td>1 Mar 2023</td><td>Existing from Fire Code</td><td>Nil</td><td>Cl.4.2.4b. Underground stations

For underground station, the fire engine accessway/ fire engine access road shall be provided to within a travel distance of 18m to the entrance of all exit staircases where landing valves (dry riser) are provided in accordance with Cl.6.2.2b.(2)(c). The measurement of 18m shall be between the fire engine accessway/ fire engine access road and the entrance of exit staircase.</td></tr>
<tr><td>38</td><td>1 Sep 2022</td><td>Based on Fire Code 2018</td><td>Existing from Fire Code</td><td>Nil</td><td>Cl.4.2.4e. Gradients

Fire engine accessway shall be laid on a level platform or if on an incline, the gradient shall not exceed 1:15. A fire engine access road shall be laid on an incline not exceeding a gradient of 1:8.3.</td></tr>
<tr><td>39</td><td>1 Sep 2022</td><td>Based on</td><td>Existing from</td><td>Cl.4.2.4d.(7) Overhead clearance</td><td>Cl.4.2.4g.(5) Overhead clearance</td></tr>
</table>

		Fire Code 2018	Fire Code	An overhead structure shall only be permitted over fire engine accessway/ fire engine access road subject to the following: (a) the overhead clearance for passage of firefighting appliances shall be at least 4.5m; (b) the width of the overhead structure shall not be more than 10m; (c) where more than one overhead structure span across the fire engine accessway/fire engine access road, the separation distance between two adjacent overhead structures shall be at least 20m apart; and (d) length of the end-stretch of the fire engine accessway/fire engine access road shall be at least 20m with no overhead structure.	An overhead structure shall only be permitted over a fire engine accessway/ fire engine access road subject to all of the following (see Diagram 4.2.4g.): (1) the overhead clearance for passage of firefighting appliances shall be at least 4.5m; (2) the width of the overhead structure shall not be more than 10m; (3) where more than one overhead structure span across the fire engine accessway/ fire engine access road, the separation distance between two adjacent overhead structures shall be at least 20m apart; (4) the length of the end-stretch of the fire engine accessway/ fire engine access road shall be at least 20m with no overhead structure; and (5) the length of fire engine accessway required for the station shall exclude the stretch of fire engine accessway with the overhead structure.
40	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	*Cl.4.2.4e.(2)* Metalled/non-metalled or paved/non-paved surfaces fire engine accessway shall be marked with reflective white or yellow strips of size not less than 100mm (W) x 400mm (L). The markings shall be visible at night and shall be provided on both sides of the fire engine accessway at an interval of not more than 5m apart.	*Cl.4.2.4j.(2)* Metalled/ non-metalled or paved/ non-paved surface fire engine accessways/ fire engine access roads shall be marked with reflective white or yellow strips of size not less than 100mm (W) x 400mm (L), or white or yellow road stud reflectors of size not less than 100mm (W) x 100mm (L) x 18mm (H). The markings or reflectors shall be visible at ~~night~~ all times and shall be provided on both sides of the fire engine accessways/ fire engine access roads at an alternate interval of not more than

					5m ~~apart~~. Markings or reflectors shall also mark all corners and turning corners of the fire engine accessway. See *Diagram 4.2.4j.(2)*.
41	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.4.2.4k.* Ancillary usage of fire engine accessway/ fire engine access road Fire engine accessway/ fire engine access road shall not be turned into other usages such as pond, water features, car parking lots (including loading & unloading), etc. Turfing designed to withstand both stationary and axle loading capacity of firefighting appliances in accordance with *Cl.4.2.4d.* for fire engine accessway/ fire engine access road is only permitted on the straight stretch of the fire engine accessway/ fire engine access road with gradient not exceeding 1:15.
42	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.4.4.1e*. Ringed fire hydrant pipes For a station that is required to have an island site fire engine accessway, the fire hydrant pipe shall be a ring system. Isolation valves shall be provided on the fire hydrant ring such that on any section of ring, not more than one fire hydrant can be isolated when required for maintenance without affecting the water supply (both designed pressure and flow) to the other fire hydrants on the ring. f. Valve locking device A locking device shall be provided to lock the valves in open position during normal operation. Underground valves shall be kept in an open

					position at all times.
43	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	*Cl.5.2.1* Provision Fire extinguishers shall be provided within the station, commercial spaces and plant rooms at ground level entrances. Pedestrian underground/aboveground link leading to station entrances and services ducts need not be provided with fire extinguishers.	*Cl.6.1.2* Provision a. Fire extinguishers shall be provided within the station, commercial spaces, and plant rooms at ground level entrances except the following: (1) pedestrian underground/aboveground link leading to station entrances; (2) under-platform services ducts and cable chambers; (3) air shafts; (4) roof level of single storey stations/ buildings with roof height not more than 12m or inaccessible pitched roof up to 24m from grade level used solely for roof-mounted PV installations in accordance with Code of Practice for Fire Precautions in Buildings; and (5) roof level of an external/ open-sided overhead bridge/ shed/ linkway/ walkway with clear width less than 6m, roof height not more than 12m and used solely for roof-mounted PV installations in accordance with Code of Practice for Fire Precautions in Buildings.
44	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	*Cl.5.4.1* Hose reels a. Provision	*Cl.6.2.5* Hose reels a. Provision

				(1) Hydraulic hose reel(s) conforming to the requirements in SS 575 shall be provided throughout the stations including the underground links leading to the underground station entrances except: (a) buffer areas (including plant rooms within these areas), station platforms and outdoor cooling tower; (b) ground level entrances with no habitable rooms; (c) cable chambers and under-platform services ducts (d) air shafts;	(1) Hydraulic hose reel(s) conforming to the requirements in SS 575 shall be provided throughout the stations including the commercial spaces and underground links leading to the underground station entrances except: (a) buffer areas (including plant rooms within these areas), station platforms and outdoor cooling tower area; (b) ground level entrances with no rooms/ kiosk/ ATM; (c) cable chambers and under-platform services ducts; (d) air shafts; (e) standalone bin centres; (f) roof level of single storey stations/ buildings with roof height not more than 12m or inaccessible pitched roof up to 24m from grade level used solely for roof-mounted PV installations in accordance with Code of Practice for Fire Precautions in Buildings; and (g) roof level of an external/ open-sided overhead bridge/ shed/ linkway/ walkway with clear width less than 6m, roof height not more than 12m and used solely for roof-mounted PV installations

					in accordance with Code of Practice for Fire Precautions in Buildings. (2) Hose reels coverage for tunnel ventilation fan rooms shall be confined to the fans only.
45	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	*Cl.5.5.4* Manual alarm call points a. Manual call points shall be so located that no person need travel more than 30m to activate the alarm. b. Manual call points in the ancillary area shall be located along exit routes and next to hose reels, where provided. c. Manual call points shall be located between 800mm and 1.2m above the finished floor level and shall be located at easily accessible and conspicuous positions free from obstructions. The installation of the sounding device shall be in accordance with SS CP 10. d. Wordings on call points shall comply with SS 508. e. Manual call points and alarm bells are not required to be provided in the cable chambers, under-platform services ducts and aboveground outdoor cooling tower enclosure.	*Cl.6.3.3* Manual alarm call points a. ~~Manual call points shall be so located that no person need travel more than 30m to activate the alarm.~~ Manual alarm call points shall be provided on every storey of the ancillary area of the station and shall be so located that no person need travel more than 30m from any position within the ancillary area to activate the alarm. Station public areas need not be provided with manual alarm call points. b. ~~Manual call points in the ancillary area shall be located along exit routes and next to hose reels, where provided.~~ Manual alarm call points shall be located on exit routes preferably next to hose reels and in particular on the floor landings of exit staircases and at exits to the street. c. Manual alarm call points shall be located between 800mm and 1.2m above the finished floor level and shall be located at easily accessible and conspicuous positions free from obstructions. The installation of the sounding device shall be in accordance with SS 645. d. Wordings on call points shall comply with SS 508.

					e. Exemption Manual alarm call points and alarm sounders can be omitted for the following: (1) cable chambers, under-platform services ducts and ~~aboveground~~ outdoor cooling tower area ~~enclosure~~; (2) air shafts; and (3) open-to-sky roof gardens/terraces, provided an alarm sounder is extended to this level and positioned near the exit staircase.
46	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.6.3.4b.* Visual alarms (1) Visual alarms shall not be used in place of audible alarms and shall be provided: (a) for stations protected by fire alarm systems; and (b) in places, such as full-height enclosed washroom spaces, where persons with hearing impairment can be isolated, especially when they are not in their identified locations. (2) Visual alarms shall be located together with fire alarm sounders. Where they are not readily visible from areas accessible to persons with hearing impairment who may be in

					isolation, additional visual alarms shall be provided. The height of the visual alarms shall be between 2m to 3m above finished floor level. (3) Visual alarms shall comply with all the following requirements: (a) They shall take the form of a flashing beacon or strobe light for use in conjunction with the conventional fire alarm system. (b) They shall be clearly distinguishable from any other visual indicator used in the premises. (c) They shall be labelled with the word "Fire" of at least 15mm in height and lettering colour shall contrast with the background. (d) The flashing rate shall be within 30 to 130 flashes per minute. (e) The visual alarm signal shall be in white or red. (f) The flashing of all visual alarm signals within a same space/ room shall be synchronised. (g) The intensity of the light signal shall be sufficient to draw the attention of people in the vicinity.

47	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.6.4.1b.* Aboveground stations Every storey of stations of more than 24m in habitable height, regardless of whether the compartmentation requirements are complied with.
48	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.6.4.1d.(9)* Areas under roof-mounted PV installations on non-habitable roof Each sub-array of PV installation shall not exceed 5m in width, with maintenance aisle of minimum 400mm width in between the sub-arrays. Each sub-array shall be open-sided without any commercial activities or storage within these areas. The maximum dimensions of PV arrays shall be in accordance with Code of Practice for Fire Precautions in Buildings.
49	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.6.4.3b.* Fire pumps Installation of fire pumps for sprinkler systems shall comply with requirements of SS CP 52. Sprinkler pumps shall be installed within a fire compartmented fire pump room, whose fire rating shall be in accordance with *Table 6.4A*. The sprinkler pump/ control panel shall not be lower than the main floor level. *Cl.6.4.3c.* Location plan A floor plan showing the locations of the sprinkler tank room, sprinkler pump room, breeching inlets and control valves shall be prominently displayed next to the main fire alarm panel.

50	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	*Cl.5.6.4* Special purpose rooms a. Where a station is required to be provided with an automatic sprinkler system under this Code, parts of the station which are used for purposes stipulated in *Table 5.6A* shall be compartmented in accordance with columns 3(a) and 3(b) of the table. b. Where a station is not required to be provided with an automatic sprinkler system under this Code, special purpose rooms stipulated in *Table 5.6A*. shall be compartmented in accordance with columns 2(a) and 2(b).	*Cl.6.4.4* Special purpose rooms a. Where a station is required to be provided with an automatic sprinkler system under this Code, parts of the station which are used for purposes stipulated in ~~*Table 5.6A*~~ *Table 6.4A* shall be compartmented in accordance with columns 3(a) and 3(b) of the table. b. Where a station is not required to be provided with an automatic sprinkler system under this Code, special purpose rooms stipulated in ~~*Table 5.6A*~~ *Table 6.4A*. shall be compartmented in accordance with columns 2(a) and 2(b). c. For the protection of controls, signalling or communication equipment rooms critical for the railway operation, if automatic sprinklers are to be replaced by an automatic fire extinguishing system, the enclosure to the hazard or occupancy shall comply with all of the following: (1) It shall be constructed to have 1-hr fire resistance rating. (2) Any door opening shall be protected with a 1-hr fire door. (3) It shall not be provided with more than two exits. (4) The direct travel distance to any exit

					door of the enclosure shall not exceed 15m. (5) The fire extinguishing system shall use clean agent and shall conform to *Cl.6.5.2*.
51	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	***Cl.6.5*** **FIXED AUTOMATIC FIRE EXTINGUISHING SYSTEMS** *Cl.6.5.1* Installation Installation of any fixed automatic fire extinguishing systems which are not deemed to be required by this Code shall not be accepted as substitute of any provision stipulated in this Code unless otherwise approved by the SCDF. Such systems will be considered additional protection for property safety and their installation shall not adversely affect the performance of the stipulated systems. *Cl.6.5.2* Design standard The design and installation of such automatic fire extinguishing systems shall comply with corresponding codes of practice acceptable to the SCDF.

52	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.6.6.8* Homing of lifts a. For stations requiring fire alarm system (1) In a fire emergency, when any one of the fire detection devices or fire alarm systems is activated, all lifts except passenger lifts shall be brought to the grade or designated firefighters entry floor. Otherwise, the lifts shall home to an alternate designated floor (if the designated floor is a fire floor) and park with the lift landing doors remaining opened. (2) Goods lifts with automatic doors shall be similarly homed to the designated floor. (3) Goods lifts with manual doors shall be homed if the doors are closed. b. Requirements for alternate designated floor (1) An alternate designated floor (e.g. 2nd storey) shall be identified. (2) All lifts except passenger lifts shall be brought to the alternate designated floor in the event of a fire at the designated floor. (3) Localised detectors (a) Localised detector(s) shall be provided to cover the lift landing space at the designated floor. (b) The activation of any of the localised

					detector(s) or any other detectors or sprinklers covering the designated floor shall cause all the lifts to be re-directed to home to the alternate designated floor. (c) The localised detector(s) shall cover the area within at least 3m surrounding the lift landing door opening. (d) Where the lift landing is protected by a fire-rated enclosure, only the space within the enclosure is required to be covered by localised detector(s). (4) The alternate floor shall have minimum fire hazard, and where people can escape to safety in an exit staircase or other exit from the lift landing door. (5) In station that are not provided with sprinklers or automatic fire alarm system, suitable sensors shall be provided at the ceiling level to cover the lift landing space. The activation of any sensor shall cause the lifts to be re-directed to home to the alternate floor.
53	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.6.6.9* Provisions for lift rescue a. General The following requirements shall apply to station with blind lift hoist ways exceeding 11m. They shall be read in conjunction with SS 550.

					b. Rescue hooks (1) When the distance between consecutive lift landing doorsills is more than 11m but less than 18m, as shown in *Diagram 6.6.9b.(1) – 1*, rescue hooks complying with *Cl.6.6.9b.(3)* shall be provided at the underside of the upper lift landing door head. See *Diagram 6.6.9b.(1) – 2.* (2) Alternatively, these hooks shall be installed in the ceiling space directly above the upper lift landing door, such that the heights of these hooks are not more than 3m above the finished floor level of that upper lift landing, and at an approximate distance of 1m away from the lift shaft wall. The ceiling space shall be easily accessible, and a sign shall be provided to indicate the locations of the rescue hooks. See *Diagram 6.6.9b.(2) – 1 & 2.* (3) Rescue hook design Each rescue hook shall have pull-out strength of at least 1000kg (10kN) and a thickness of at most 14mm in diameter. The clear space between the hook and the emergency door frame shall not be less than 100mm, and the spacing between the two hooks shall be between 500 to 700mm. See *Diagram 6.6.9b.(3).* *c.* Landing emergency doors

					(1) Where the distance between consecutive lift landing doorsills exceeds 18m, intermediate landing emergency doors shall be provided, such that the distance between sills is at most 18m. However, for adjacent cars fitted with car emergency doors complying with *Cl.6.6.7d.*, intermediate landing emergency doors are not required. (2) The landing emergency doors shall conform to all the following requirements. See *Diagram 6.6.7c.(2):* (a) The dimension of landing emergency doors shall comply with the requirements of SS 550. (b) They shall be easily accessible and free from fixed obstructions. (c) They shall be either of the horizontally sliding or swinging single-leaf type. (d) They shall be self-closing and self-locking and shall be marked in letters not less than 50mm high: "DANGER, LIFT WELL". (e) They shall be provided with a landing door lock which can be unlocked only from the landing side through the use of a key. The lock shall not be unlocked by any key

					which will open any other lock or device used for any other purpose in the building/ station. The key shall be kept where it is accessible only to authorised persons. (f) Each door shall be provided with an electrical contact, the opening of which will render the lift inoperable. (g) Two rescue hooks complying with *Cl.6.6.7b.(3) shall be provided at the underside of each emergency door head. Alternatively, these hooks can also be installed in the ceiling space as stipulated under Cl.6.6.7b.(2).* d. Car emergency doors (1) When car emergency doors are provided in adjacent cars to permit the lift-to-lift rescue and evacuation of passengers, there is no limit on the maximum allowable length of the blind lift hoist way. See *Diagram 6.6.9d.(1).* (2) When car emergency doors are provided, all of the following requirements shall be complied with. See *Diagram 6.6.9d.(2):* (a) The horizontal distance between cars shall comply with the requirements of SS 550. (b) The dimension of car emergency doors

					shall comply with the requirements of SS 550. (c) Car emergency doors shall be openable from outside the car without a key and from inside the car using a key. (d) Car emergency doors shall open towards the inside of the car. (e) Car emergency doors shall not be located in the path of a counterweight or in front of a fixed obstacle (except for beams separating the cars) preventing passage from one car to another. (f) A portable/ movable bridge or a bridge integrated into the car complying with the requirements of SS 550 shall be provided. (g) Each car emergency door shall be provided with an electric safety device, the opening of which will render the lift inoperable. A safety feature to prevent the lift from operating when the bridging plate or the handrail is deployed shall also be provided.
54	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	***Cl.6.7*** **COLOUR SCHEME OF FIRE PROTECTION SYSTEMS**

					Cl.6.7.1 Equipment, fixtures, and fittings The following equipment, fixtures, and fittings for the fire protection systems shall be painted in red. For those equipment, fixtures, and fittings not listed below, the colour scheme shall be in accordance with that specified in the relevant codes of practice. a. Fire sprinkler system (1) Fire pump & control panel (2) Breeching inlet (excluding breeching inlet cabinet/ enclosure) (3) Sprinkler control valve (4) Sprinkler water proofing system/device b. Electrical fire alarm system (1) Main fire alarm panel/ cabinet (2) Sub fire alarm panel/ cabinet (3) Manual alarm call point (4) Visual alarm light housing (Note: fire alarm bell need not be in red) c. Private fire hydrant (1) Wet pillar hydrant (with yellow band in accordance with SS 575)

					(2) Dry pillar hydrant (whole hydrant in yellow) d. Dry rising mains (1) Fire pump & control panel (2) Breeching inlet (excluding breeching inlet cabinet/ enclosure) (3) Dry riser breeching inlet in yellow (4) Landing valve (except dry landing valve to be in yellow) (5) Rising mains pipe (6) Standby hose cabinet/ enclosure e. Hose reel system (1) Hose reel pump & control panel (2) Hose reel drum (excluding cabinet/enclosure) f. Total flooding fire extinguishing system Breathing apparatus cabinet/ enclosure g. Emergency Voice Communication System Handset/ cabinet/ enclosure

					h. Fire extinguisher Housing cabinet/ enclosure (Note: Alternatively, red graphic signage or red wordings "Fire Extinguisher" of minimum size 20mm shall be provided.) *Cl.6.7.2* Pipework, conduits, trunkings, and cable trays For fire protection systems pipework/ conduits/ trunkings/ cable trays which are not required to be painted in red, red colour bands of width not less than 20mm and labelling shall be provided at an interval of not more than 6m apart. *Cl.6.7.3* Graphical symbols Graphical symbols to depict fire safety equipment are allowed for use in stations provided the signs comply with SS 508. Either graphic or text format can be used for the design of the signage. *Table 6.7.3* shows the different sizes of the graphical symbol with respect to the viewing distance.
55	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.7.1.2* Construction of ductwork Ducts for air-conditioning and mechanical ventilation systems shall be constructed in compliance with all the following requirements: a. Materials Air-conditioning or other ventilation ducts,

					including framing thereof, shall be constructed of steel, aluminium, glass fibre batt, mineral wool batt, or other approved materials. b. Support Air-conditioning or other ventilation ducts shall be adequately supported. c. Duct coverings, duct linings, and flexible connection Duct covering, duct linings, and flexible connection shall be non-combustible. However, if it is necessary to use combustible material, it shall: (1) when tested in accordance with methods specified in this Code, have a surface flame spread rating of not lower than Class 0; (2) when involved in fire, generate a minimum amount of smoke and toxic gases; and (3) be at least 1m away from a fire damper. d. Flexible joints and connections (1) Flexible connections at the ends of ventilation ductwork connecting terminal units, extract units, and ventilation grilles shall not exceed 4m. (2) Flexible joints, which are normally provided to prevent and/ or allow for thermal

					movements in the duct system, shall not exceed 250mm in length. (3) Flexible joints shall be made of material classified as 'not easily ignitable' when tested under BS 476: Part 5. e. Duct enclosure Enclosure of ducts shall comply with the requirements in *Cl.3.8.9a.*. f. Ductwork through smoke-free or fire lift lobbies Ventilation ducts shall not pass-through smoke-free or fire lift lobbies. Where unavoidable, the part of the ventilation duct within the lobby shall be enclosed in masonry construction with fire resistance rating at least equal to that of the elements of structure. If other forms of fire resisting construction are used, a fire damper shall be fitted where the duct penetrates the lobby enclosure. g. Ductwork through separating walls No air-conditioning or ventilation duct shall penetrate separating walls. h. Fire-rated duct (1) Where proprietary fire-rated materials are used to construct the fire-rated duct, the fire rating of the fire-rated duct shall have the same period of fire resistance as the wall or

					floor it penetrates. (2) Proprietary fire-rated duct shall be tested to BS 476: Part 24 or equivalent and its usage be approved by the SCDF. (3) Running of non-fire-rated duct and/ or other station services above the proprietary fire-rated duct shall be avoided. When unavoidable due to physical constraints, the supports to such non-fire-rated duct and/ or other station services running above the proprietary fire-rated duct shall be strengthened, such that the tensile stress generated on the supports shall not exceed $10N/mm^2$. The non-fire-rated duct and/ or station services shall also be adequately protected to prevent collapse in a fire which will otherwise affect the stability of the proprietary fire rated duct below. (4) Fans forming part of a fire-rated duct shall also be enclosed in the same fire-rated enclosure. i. Control panel (1) The location and placement of control panels serving engineered smoke control and smoke purging systems shall be located next to the main alarm panel or in rooms with at least 1 hr fire resistance. The control panels shall be clearly visible, readily accessible for operation and maintenance, and mounted at a height not more than 1.8m from the finished

					floor level.
56	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.7.1.5* Fire Dampers Any fire damper shall have a fire resisting rating of not less than that required for the compartment wall or compartment floor through which the relevant section of the ventilation duct passes. Fire dampers shall be of the type approved by the SCDF and constructed in accordance with the requirements in SS 333. a. Provision of fire dampers Ventilation ducts which pass directly through a compartment wall or compartment floor shall comply with the following: (1) where the ventilation duct does not form a protected shaft or is not contained within protecting structure, the duct shall be fitted with a fire damper where it passes through the compartment wall or compartment floor; and (2) where the ventilation duct forms a protected shaft or is contained within a protecting structure, the duct shall be fitted with fire dampers at the shaft inlets and outlets. b. Installation of fire dampers (1) Fire dampers shall be installed so that the casing completely penetrates through the compartment wall or floor, and the casing

					shall be retained, either: (a) on both sides by means of flanges in such a manner that it can expand under fire conditions without distorting the blades in the closed position, or (b) on the accessible side by means of one flange only, which can be fixed to the damper and to the wall through slotted holes to allow for expansion. (2) Flanges shall be butted against the face of the compartment wall or floor and fixed to the damper casing. (3) Ductwork connected to the damper shall be attached in such a manner as to ensure that the damper remains securely in position and is fully functional in the event of damage of ductwork. (4) The clearance between the damper body and the sides of the penetration shall not be less than that of the tested prototype and be not greater than half the width of the angled section of the collar. (5) The space between the damper body and the opening in the wall or floor shall be fire-stopped. (6) Vertically positioned fire dampers shall be installed in such a manner that the direction of air flow assists in the closure of the

					damper. (7) Connections to fire dampers The distance between the plane through a closed fire damper and ducting, flexible connections, duct coverings, internal linings, and the like, shall be: (a) no less than 1m when such parts are made of materials with fusing temperatures less than 1000°C; (b) no less than three times the diagonal or diameter of the damper; and (c) no less than 2m when such parts are made of materials that are combustible, except for vapour barrier to provide thermal insulation. (8) Fire damper inspection access doors Each fire damper installation shall be provided with an inspection access door in the ventilation duct, either upstream or downstream, as appropriate. The access door dimension shall measure 450mm (L) x 450mm (W); for smaller ducts, the door width dimension can be reduced to the width or depth of the duct. Access doors shall be hinged and fitted with sash locks and be constructed of minimum 1.25mm suitably braced sheet steel. Openings in ducts shall be stiffened by a sheet steel

					frame. c. Prohibition of fire dampers Fire dampers shall not be fitted in any of the following locations: (1) openings for ducts of emergency ventilation systems in walls of ventilation shaft, or (2) openings in walls of a protected shaft when the openings have a kitchen exhaust duct passing through it, or (3) opening in walls of a protected shaft when the openings have a fume hood exhaust duct passing through it, or (4) anywhere in an air pressurising system, or (5) in locations explicitly prohibited in this Code.
57	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.7.1.6* Locations of intakes and return air openings a. Openings for the intakes of outdoor air to all air handling systems, mechanical ventilation systems, pressurisation systems of exit staircases and internal corridors, and smoke control systems shall be no less than 5m from any exhaust discharge openings. b. All return air openings and outdoor air intakes shall be located and arranged such that sources

					of ignition, such as lighted matches and cigarette butts, which accidentally enter the openings and intakes cannot be deposited onto the filter media. c. Re-circulation of smoke ……
58	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.7.1.7* Air handling unit (AHU) room Rooms having no other usage than housing air handling equipment or package units and their associated electrical controls are not regarded as areas of high risk. a. Compartmentation (1) Where the air handling equipment serves more than one compartment, fire dampers shall be provided in air ducts at penetrations through the compartment walls and floors to comply with the requirements in *Cl.7.1.5*. (2) Where AHU rooms are vertically stacked, each AHU room shall be separated by a compartment floor at every level. b. Smoke detectors (1) Smoke detectors of approved type shall be incorporated in the return air stream immediately adjacent to: (a) AHUs serving more than one storey or

					compartment, or (b) a single AHU in excess of 15000m³/h. (2) The function of smoke detectors, where required by this Code, is to initiate action to shut down the AHU automatically when the smoke density in the return air system has become unacceptable for recycling. c. Stop switch Where the AHUs in a station are not centrally controlled, each AHU exceeding 8500m³/h shall be provided with a manual stop switch to facilitate quick shutting down of the fan in the case of fire. For ease of access, this switch shall be located on the wall next to the door opening of the air handling equipment room.
59	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.7.1.8* Ventilation system for exit staircase and internal exit passageway A mechanical ventilation system for each exit staircase and internal exit passageway, if provided, shall be an independent system of supply mode exclusive to the particular staircase, or internal exit passageway, and it shall comply with all of the following requirements: a. Supply air for the system shall be drawn directly from the external space/ air shaft, with intake point not less than 5m from any exhaust discharge openings.

					b. For exit staircase serving more than four storeys, supply air shall be conveyed via a vertical duct extending throughout the staircase height and discharging through outlets distributed at alternate floors. c. Where the supply air duct serving the exit staircase must penetrate the staircase enclosure, the portion of the duct where it traverse outside the staircase shall be enclosed in masonry construction or drywall complying with Cl.3.8.7c. of at least the same fire resistance as the elements of structure, and it shall not be fitted with fire dampers. d. The ventilation system shall be of supply mode only, and of not less than 4 air changes per hour. e. The mechanical ventilation system shall be automatically activated by the station fire alarm system. In addition, a remote manual start-stop switch shall be made available to firefighters at the FCC, or, where there is no FCC, next to the main fire alarm panel. f. Visual indication of the operational status of the mechanical ventilation system shall be provided. g. The mechanical ventilation for the exit staircase shall be maintained at higher pressure with respect to the mechanical ventilation system of the adjacent fire lift lobby. h. Where duct risers are required to be enclosed in protected shafts, the protected shafts shall be

					enclosed in masonry construction or drywall complying with *Cl.3.8.7c.*.
60	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.7.1.9* Ventilation system for smoke-free lobby and fire lift lobby a. The ventilation system shall be of supply mode only of not less than 10 air changes per hour. b. Supply air shall be drawn directly from the external space/ air shaft with intake point not less than 5m from any exhaust discharge or openings for natural ventilation. c. Any part of the supply duct running outside the smoke-free or fire lift lobby which it serves shall either be enclosed or constructed to give a 1-hr fire resistance rating. The SCDF may, at its discretion, require a higher fire resistance rating if the duct passes through an area of high fire risk. d. The mechanical ventilation system shall be automatically activated by the station fire alarm system. In addition, a remote manual start-stop switch shall be made available to firefighters at the FCC or where there is no FCC, next to the main fire alarm panel. e. Visual indication of the operational status of the mechanical ventilation system shall be provided.
61	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.7.1.10* Ventilation system for fire pump room and generator room

					Where mechanical ventilation is installed to provide a smoke-free environment for the room housing the fire pump or emergency generator, such systems shall be independent of each other and of any other system serving other parts of the station/ building, and shall comply with all of the following requirements: a. Supply air shall be drawn directly from the external space/ air shaft and its intake point shall not be less than 5m from any exhaust discharge openings. Exhaust discharge shall also be direct to the external space/ air shaft. b. Where the corresponding ducts run outside the room, they shall either be enclosed in a structure or be constructed to give at least the same fire rating as the room which they serve, or that of the room through which they traverse, whichever is higher. The rating shall apply to fire exposure from both interior and exterior of the duct or structure. Where the duct risers are required to be enclosed in a protected shaft constructed of masonry or drywall complying with *Cl.3.8.7c.*, they shall be compartmented from the rest of the shaft space containing other ducts or service installations. c. No fire damper shall be fitted in either supply or exhaust duct required under this clause. d. A duct serving areas other than rooms housing equipment stated in this clause shall not pass through such rooms.

62	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.7.1.11* Ventilation system for Fire Command Centre (FCC) The FCC can either be air-conditioned, naturally ventilated, or mechanically ventilated. The air-conditioning or mechanical ventilation shall be independent of each other and any other system serving other parts of the station. Where mechanical ventilation is required, it shall also comply with all the following requirements: a. Supply air shall be drawn directly from the external space/ air shaft and its intake point shall not be less than 5m from any exhaust discharge openings. Exhaust discharge shall also be direct to the external space/ air shaft. b. Where the corresponding ducts run outside the FCC, they shall either be enclosed in a structure or be constructed to give at least the same fire rating as the room which they serve or that of the room through which they traverse, whichever is higher. Where the duct risers are required to be enclosed in a protected shaft constructed of masonry or drywall complying with *Cl.3.8.7c.*, they shall be compartmented from the rest of the shaft space containing other ducts or service installations. c. No fire damper shall be fitted in either supply or exhaust duct required under this Clause. d. A duct serving areas other than the FCC shall not pass through the room.

63	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.7.1.12* Exhaust system for kitchen a. Provision A mechanical exhaust system for the cooking area of a kitchen in an eating establishment or the like shall be independent of those serving other parts of the station. It shall also comply with all the following requirements: (1) The hood and ducts for the exhaust shall have a clearance of 500mm from unprotected combustible materials. (2) The exhaust shall discharge directly to the external space/ air shaft and shall not be less than 5m from any air intake openings. (3) The exhaust duct, where it runs outside the kitchen, shall either be enclosed in a structure or be constructed to give at least the same fire rating as the kitchen or that of the room through which it traverses, whichever is higher. The rating shall apply to fire exposure from both interior and exterior of the duct or structure. Where the duct riser is required to be enclosed in a protected shaft constructed of masonry or drywall complying with *Cl.3.8.7c.*, it shall be compartmented from the rest of the shaft space containing other ducts or services installations. (4) No fire damper shall be fitted in kitchen exhaust ducts.

					b. Sharing of kitchen exhaust system Sharing of kitchen exhaust system for food and beverage outlets is allowed, provided all the following conditions are complied with: (1) For food courts (a) The food court shall be under a single ownership/ operator. (b) All kitchen exhaust ducts running outside the food court shall have 1-hr fire resistance rating or shall not be less than that for the elements of structure, whichever is higher. (2) For restaurants/ small F&B outlets (e.g. snack bars, food kiosks, etc.) (a) Restaurants and small F&B outlets that are sharing the same kitchen exhaust system shall be located on the same storey and within the aggregate zone area not exceeding 2000m^2. The maximum length of the aggregate zone covering from the first to the last restaurant/ F&B outlet shall not exceed 50m. (b) The aggregate floor area of the restaurants and F&B outlets shall not exceed 1000m^2.

					(c) Common ducts shall be provided with a common exhaust fan. (d) The station shall be protected by an automatic fire sprinkler system. (e) The exhaust hood shall be fitted with a wet chemical fire extinguishing system. (f) The fire rating of the common kitchen exhaust duct running outside the restaurants shall have 1-hr fire resistance rating or shall not be less than that for the elements of structure, whichever is higher. (Note: Kitchen exhaust ducts include both horizontal and vertical ducts.) c. Kitchen exhaust duct (1) A kitchen exhaust duct running outside a station shall not be located within 3m of any unprotected openings. This separation distance can be reduced to 1.5m if the unprotected opening is on the same plane as the duct. See *Diagram 7.1.12c.(1) - 1 and 2*. (2) Where the distances mentioned above cannot be achieved, a fire resistant construction having at least ½ hr fire resistance shall be placed between the duct and the unprotected opening. See

					Diagram 7.1.12c.(2). (3) A non-fire-rated kitchen exhaust duct shall not be located above an LPG storage cabinet unless they are separated from LPG cylinders by a minimum of 2-hr fire-rated masonry construction above and beside the cylinders. See *Diagram 7.1.12c.(3).* (4) The kitchen exhaust duct shall be located at least 3m from any unprotected LPG cylinders. Non-fire-rated kitchen exhaust duct shall be located at least 600mm from the vapouriser or any liquid-phase LPG pipeline. See *Diagram 7.1.12c.(4).* d. Maintenance All kitchen exhaust systems shall be properly maintained. The entire (interior and exterior) exhaust duct and kitchen hood shall be degreased and cleaned at least once every 12 months. The work shall be carried out by a specialist and the records of cleaning and degreasing shall be kept by the owner/ operator for verification. This requirement shall be included in the Fire Safety Instruction Manual.
64	1 Sep 2022	1 Mar 2023	Existing from Fire Code	Nil	*Cl.7.1.13* Ventilation system for rooms housing batteries Rooms housing batteries shall comply with the following requirements:

					a. The batteries shall be of either vented or sealed type. b. The room ventilation system shall be designed to limit the maximum concentration of Hydrogen (H_2) gas to 1% of the total volume of the room during the worst-case event of simultaneous "boost" charging of the batteries. The inlets and outlets of the ventilation system shall be properly located so that there is no stagnant area in the room. c. Adequate hydrogen gas detectors shall be provided inside the room to monitor the hydrogen concentration and to activate the fan, if necessary, to ensure that the hydrogen concentration level at any part of the room does not exceed 1% of the total volume of the room. Display panels showing the readings of the detectors shall be located at the entrance to the room. At the same time, an alarm signal shall be sent to a manned station such as PSC, guard house or FCC. d. The design of the battery room ventilation shall be in accordance with BS EN IEC 62485-2 & BS EN IEC 62485-3. e. For mechanically ventilated battery rooms, the ventilation requirement shall be based on *Cl.7.1.13d.*, or 6 air changes per hour, whichever is higher. f. No fire damper shall be provided in the essential ventilation system and ducts passing through

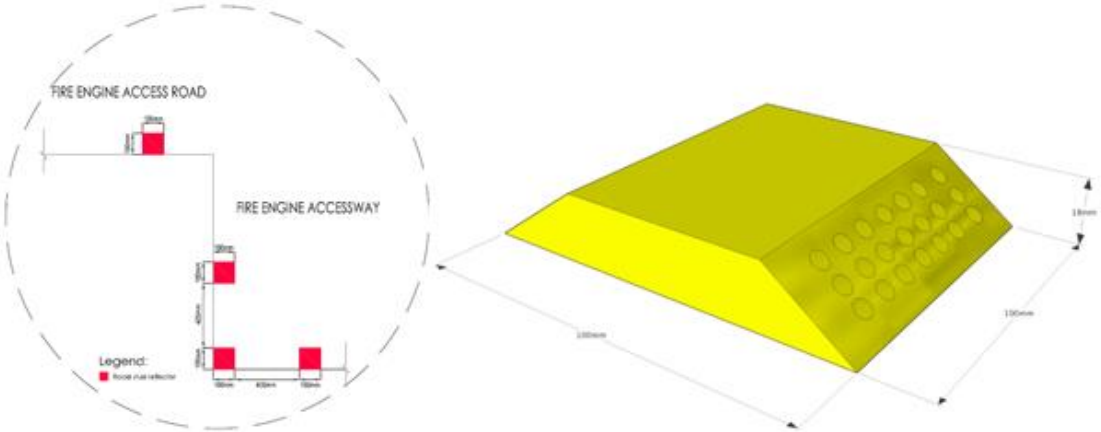
					other compartments shall have 2-hr fire resistance rating. g. Essential fans and associated electrical controls shall be backed up with a secondary source of power supply.
65	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	***Cl.7.2*** **PRESSURISATION FOR EXIT STAIRCASES** *Cl.7.2.1* Provision a. Internal exit staircase In any station of which the habitable height exceeds 24m, any internal exit staircases without adequate provision for natural ventilation shall be pressurised to comply with the requirements in this Code. Where the upper part of the staircase is naturally ventilated, its lower part can be provided with mechanical ventilation or pressurisation, whichever is appropriate. b. Basement In a station comprising more than four basement storeys, exit staircases connected to a fire lift lobby in basement storeys shall be pressurised to comply with the requirements in this Code. *Cl.7.2.2* Pressurisation level a. When in operation, the pressurisation system shall maintain a pressure differential of not less than 50Pa between the pressurised exit staircase

					and the occupied area when all doors are closed. b. Where a smoke-free lobby is also pressurised, the pressure at the exit staircase shall always be higher. c. The force required to open any door against the combined resistance of the pressurising air and the automatic door closing mechanism shall not exceed 110N at the door handle.
66	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	Nil	*Cl.7.2.3* Egress velocity a. When in operation, the pressurisation system shall maintain an airflow of sufficient velocity through open doors to prevent smoke from entering the pressurised area. b. The flow velocity shall be attained when a combination of two doors from any two successive storeys and the main discharge door are fully open. c. The velocity averaged over the full area of each door opening shall not be less than 1.0m/s. *Cl.7.2.4* Leakages a. The rate of supply of pressurised air to the pressurised areas shall be sufficient to make up for loss through leakages into the unpressurised surroundings. b. Adequate relief of leaked air out of the occupied area shall be provided to avoid a pressure build-

					up in this area. The relief can be in the form of perimeter leakages or purpose-built extraction systems. *Cl.7.2.5* Distribution of pressurising air a. The number and distribution of injection points for supply of pressurising air to the exit staircase shall ensure an even pressure profile complying with *Cl.7.2.2*. b. The arrangement of the injection points and the control of the pressurisation system shall be such that when the opening of doors or other factors cause significant variations in pressure difference, the condition in *Cl.7.2.2*. shall be restored as soon as practicable. *Cl.7.2.6* Pressurisation equipment and controls a. All the equipment and the relevant controls associated with the pressurisation system shall be designed and installed to ensure satisfactory operation in the event of a fire. b. Supply air for the pressurisation system shall be drawn directly from the external space/ air shaft and its intake shall not be less than 5m from any exhaust discharge openings. c. The pressurisation system shall be automatically activated by the station fire alarm system. In addition, a remote manual start-stop switch shall be made available to firefighters at the FCC, or next to the fire alarm panel where there is no

					FCC. Visual indication of the operation status of the pressurisation system shall be provided.
67	1 Sep 2022	Based on Fire Code 2018	Existing from Fire Code	*Cl.6.6.1* Provision The fan and its associated controller for the following system shall be provided with redundancy such that the system performance is not affected when one of the fan and/or controllers is out of operation due to routine maintenance or break-down. a. Mechanical ventilation systems for (1) smoke-stop/fire lift lobbies, (2) exit staircases, (3) essential rooms (e.g. sprinkler/hydrant/hose reel pump room, standby generator room, FCC, etc.) b. Engineered smoke control system, c. Smoke purging system, and d. Pressurisation systems for smoke-stop/fire lift lobbies and exit staircase.	*Cl.7.4.1* ~~Provision~~ Powered system A standby fan (N+1) shall be provided for each of the following systems, such that in the event one of the duty fans fails or taken out of service, the standby fan shall be automatically activated to meet the required ventilation rate: a. mechanical ventilation systems for: (1) smoke-free/ fire lift lobbies; (2) exit staircases; and (3) essential rooms (e.g. sprinkler, wet riser, hydrant, hose reel pump room, standby generator room, FCC, etc.). b. engineered smoke control system; c. smoke purging system; and d. pressurisation systems for smoke-free/ fire lift lobbies and exit staircase.
68	1 Sep 2022	1 Sep 2022	Deletion	*Cl.1.4.22* Detraining load Detraining load refers to the number of passengers alighting from a train at a platform.	~~*Cl.1.4.22* Detraining load~~ ~~Detraining load refers to the number of passengers alighting from a train at a platform.~~
69	1 Sep 2022	1 Sep 2022	Deletion	*Cl.1.4.28* Entraining load	~~*Cl.1.4.28* Entraining load~~

				Entraining load refers to the number of passengers boarding a train during a given period.	~~Entraining load refers to the number of passengers boarding a train during a given period.~~
70	1 Sep 2022	1 Sep 2022	Deletion	*Cl.1.4.46* Headway Headway refers to the time interval between arrival of consecutive trains of the same service at the platform of a station.	~~*Cl.1.4.46* Headway~~ ~~Headway refers to the time interval between arrival of consecutive trains of the same service at the platform of a station.~~
71	1 Sep 2022	1 Sep 2022	Deletion	*Cl.1.4.50* Link load Link load refers to the number of passengers travelling between two stations over a given period.	~~*Cl.1.4.50* Link load~~ ~~Link load refers to the number of passengers travelling between two stations over a given period.~~



Detail A : Corner marking on fire engine accessway

Isometric view of road stud reflector

Diagram 4.2.4j.(2): Markings for Fire Engine Accessway/ Fire Engine Access Road

Annex B

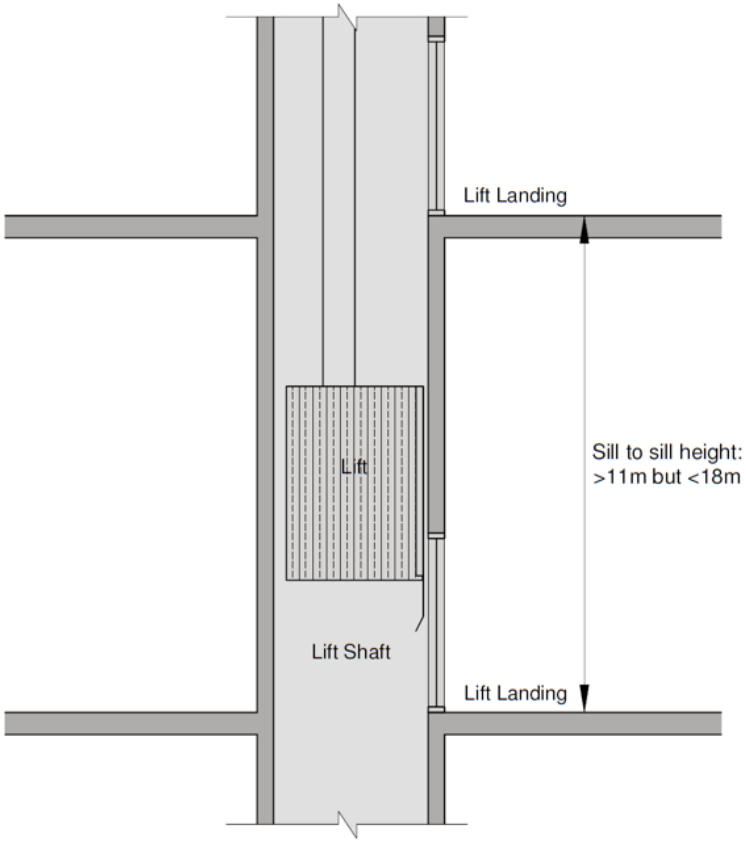


Diagram 6.6.9b.(1) – 1: Lift Landing Sill to Sill Distance > 11m but < 18m

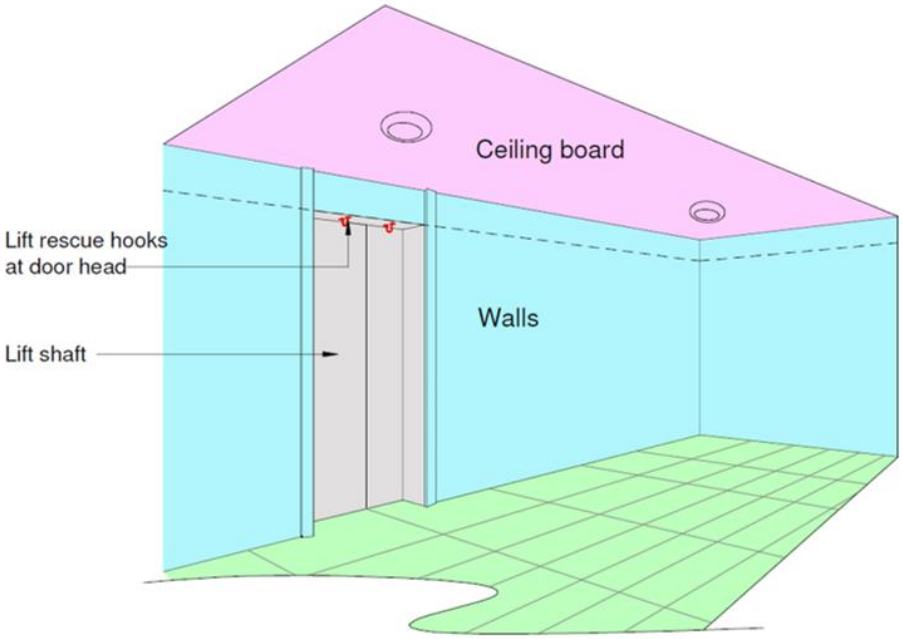


Diagram 6.6.9b.(1) – 2: Rescue Hooks Located at Lift Landing

Annex B

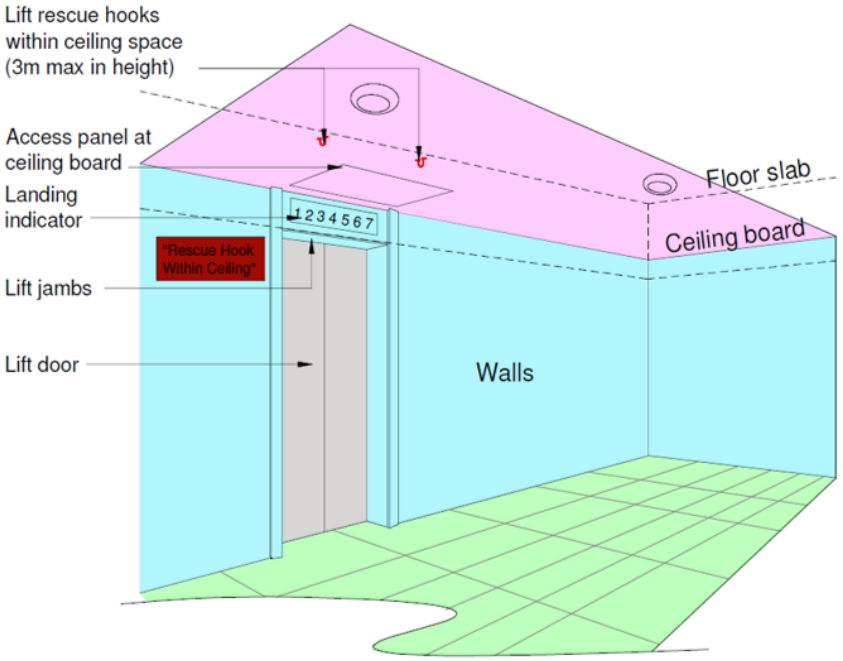


Diagram 6.6.9b.(2) – 1: Rescue Hooks Located Within Lift Landing Ceiling Space

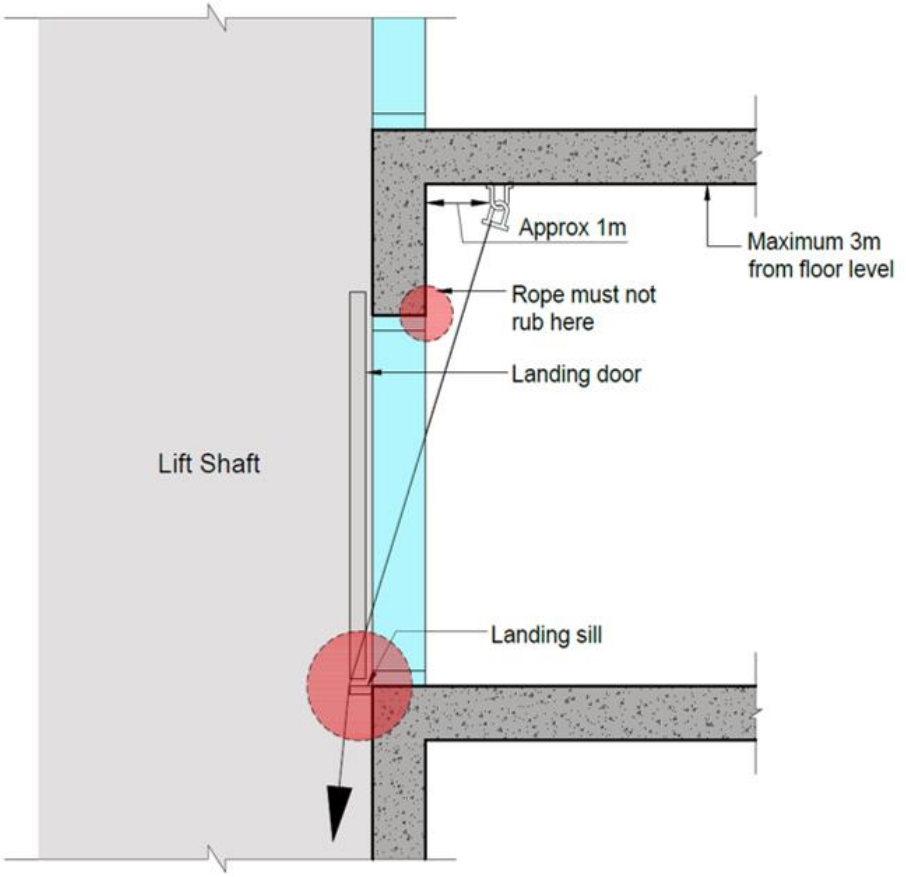
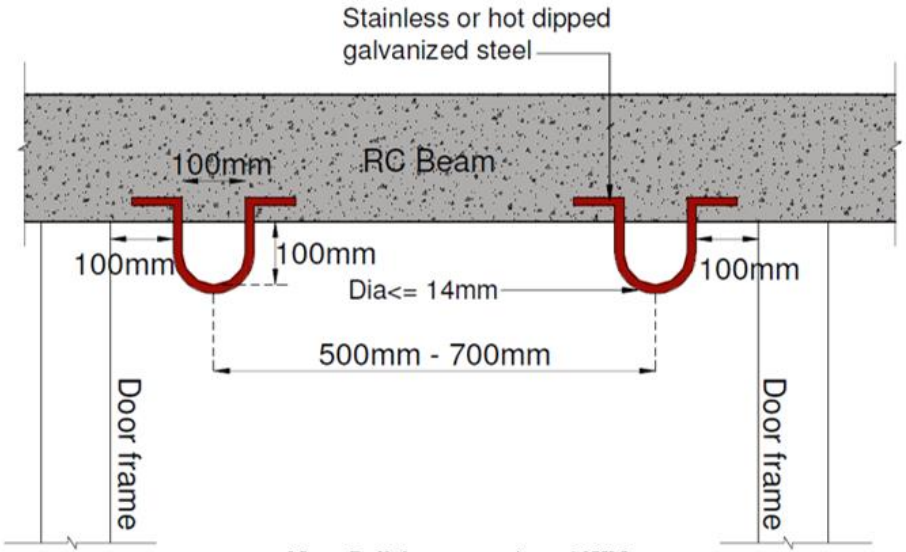


Diagram 6.6.9b.(2) – 2: Rescue Hooks Located Within Lift Landing Ceiling Space

Annex B



Note: Pull down capacity = 10KN

Diagram 6.6.9b.(3): Rescue Hook Design

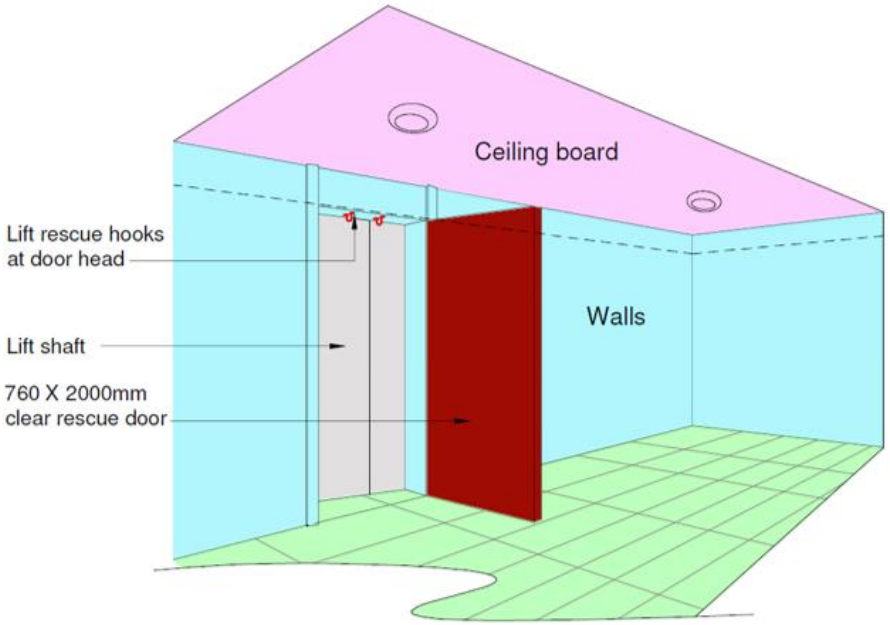


Diagram 6.6.9c.(2): Landing Emergency Door

Annex B

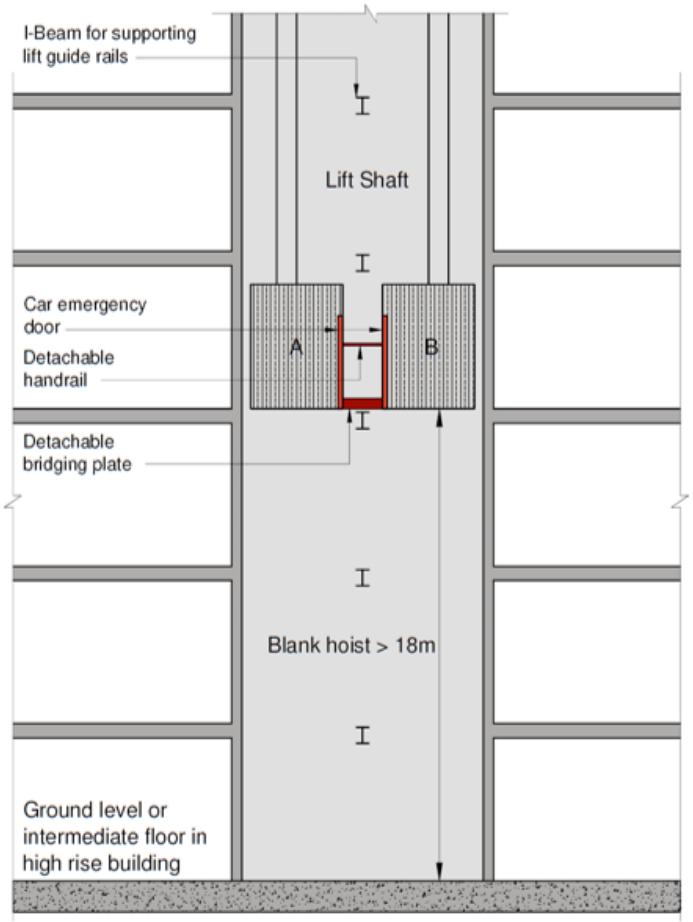


Diagram 6.6.9d.(1): Car Emergency Doors for Lift-to-lift Rescue

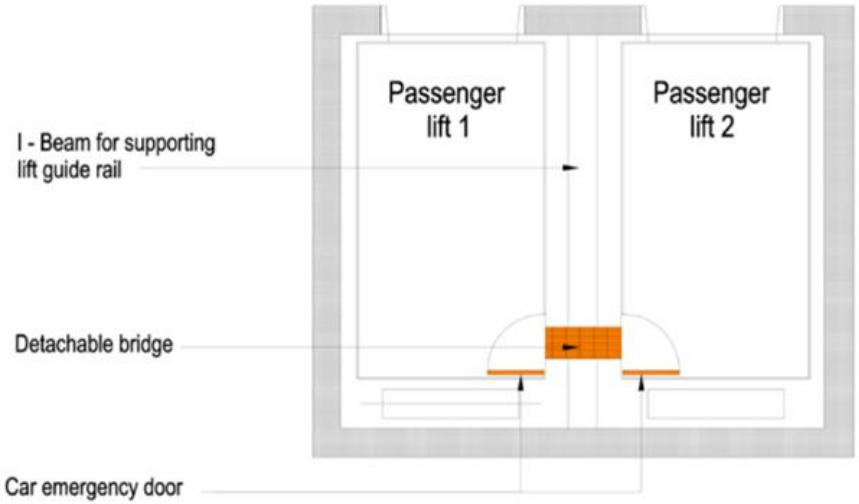


Diagram 6.6.9d.(2): Car Emergency Doors – Deployed of Bridging Plate

Annex B

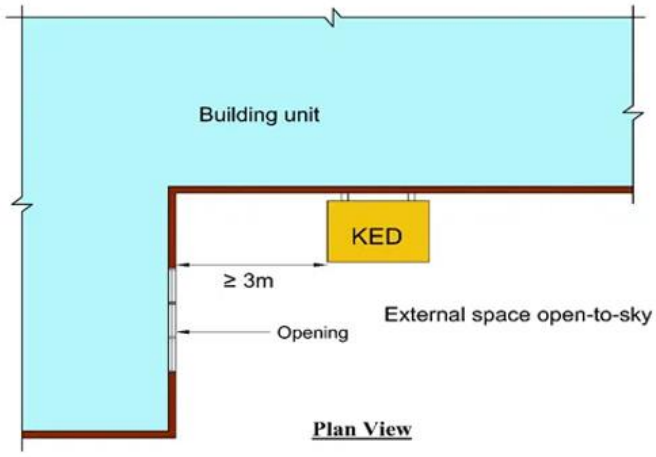


Diagram 7.1.12c.(1) – 1: Unprotected opening perpendicular to the kitchen exhaust duct

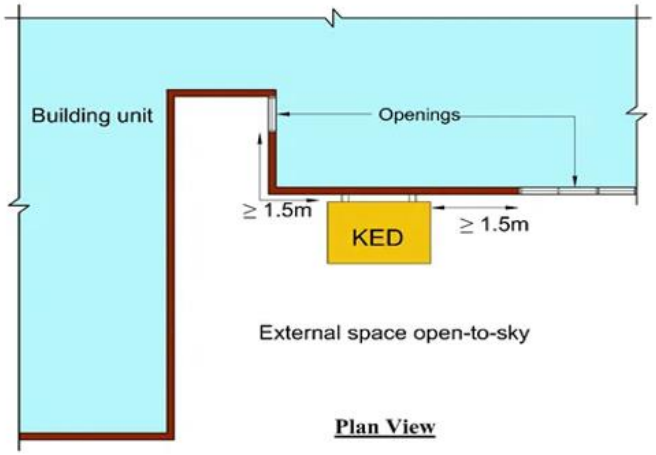


Diagram 7.1.12c.(1) – 2: Unprotected opening parallel to the kitchen exhaust duct

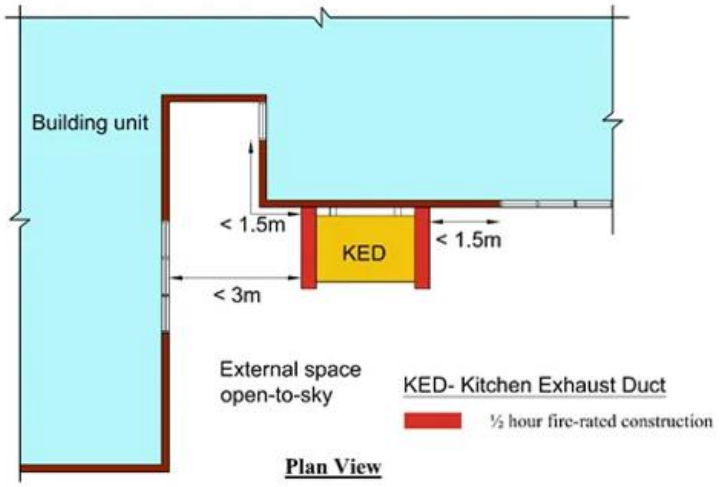


Diagram 7.1.12c.(2): Fire resistance construction for kitchen exhaust duct

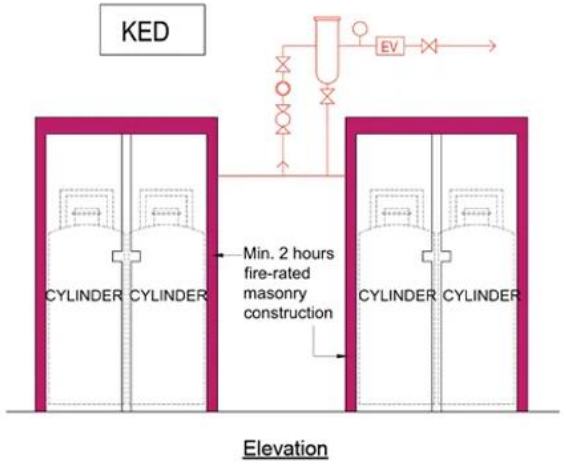


Diagram 7.1.12c.(3): Installation of non-fire-rated kitchen exhaust duct above LPG cylinders

Annex B

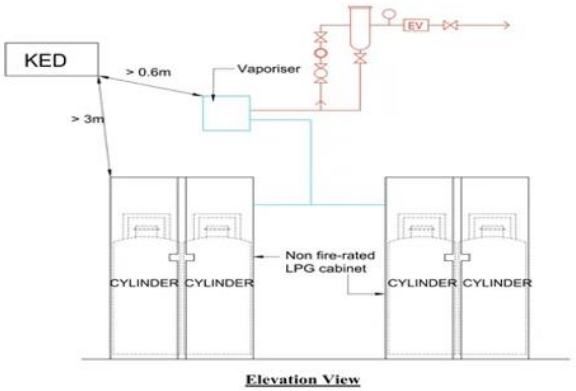


Diagram 7.1.12c.(4): Installation of non-fire-rated kitchen exhaust duct in close proximity to LPG cylinders and vapouriser

TABLE 1.4.60: OCCUPANT LOAD FACTORS		
Functional Spaces	**Factor (m^2/person)**	**Remarks**
Station platform areas	0.5 [1]	
Shops	5	
Bicycle kiosk	5	
Office	10	
Operation Control Centre	10	
Passenger Service Centre	10	
Store room	30	
Bicycle parking area	30	
Pedestrian linkway/ Concourse	*	non-simultaneous
Lobby/ corridor/ staircase	*	non-simultaneous
Toilets	*	non-simultaneous
Staff room/ Locker room	*	non-simultaneous

Note:

* - Non-simultaneous (not considered for occupant load calculation)

1 - For train peak load, it shall include:
- train fully seated
- train car standing areas to compute as 4 passengers/m^2

For train peak load by train type and car length – refer *Table 1.4.83*

TABLE 1.4.83: TRAIN PEAK LOAD			
Train Type	**Train Car length (m)**	**Number of Train Cars***	**Train Peak Load**
LRT	~12	1	88
		2	176
MRT	~19	3	450
		4	600
MRT	~23	3	670
		4	890
		6	1340
		8	1780

Note:

* - Train Peak Load for any total train cars not listed here will be multiply/ proportion according to respective train type and car length

TABLE 2.2.17l.(2) - 1: PRE-REQUISITES FOR USE OF ELECTROMAGNETIC/ ELECTROMECHANICAL LOCKING DEVICE			
Location	**Approved automatic fire alarm or sprinkler systems**	**Emergency lighting***	**Manual override device (Emergency Door Release)****
Exit access doors and/ or exit doors in the escape path for the public.	Yes	Yes	Yes
Doors to access essential rooms for fire protection systems, as stipulated under *Cl.8.2.7*, except those rooms directly accessed from escape path for the public	Yes	Yes	Yes
Exit access door and/ or exit door to rooms not in the escape path for the public.	Yes	Yes	Yes

Note:

- Linking of the locking devices through other systems to the station fire alarm system or sprinkler system is not permitted.

- Signage complying with SS 508 shall be installed on the egress side of doors reading “Emergency Exit. Door will automatically unlock in case of fire/ emergency”.

* Manual override devices shall be provided with a minimum level of illuminance in accordance with SS 563

** Activation of manual override device for emergency door release shall automatically and immediately unlock the doors to facilitate egress. The manual override device shall be located within the occupancy space, 1.2m above the finished floor level and within 1.5m of the door jamb. The manual override device shall be readily accessible and clearly identified by a sign that reads “Emergency Door Release”. Any device used by staff for access control to facilitate their day-to-day operations shall not be considered as a substitute for the manual override device. The manual override device, when operated, shall result in direct interruption of power to the lock independent of the control system electronics.

TABLE 2.2.17l.(2) - 2: DE-ENERGISE REQUIREMENTS FOR ELECTROMAGNETIC/ ELECTROMECHANICAL LOCKING DEVICE				
Location	**Any power failure to affected spaces/ areas**	**Under fire alarm activation**	**Any fault in the locking devices/ components related to the release of locking mechanism***	**Upon activation of a manually operated switch by authorised personnel manning the PSC, or in the absence of which, at the OCC**
Exit access doors and/ or exit doors in the escape path for the public	To be released immediately**	To be released immediately	To be released immediately	To be released immediately
Doors to access essential rooms for fire protection systems, as stipulated under *Cl.8.2.7*, except those rooms directly accessed from escape path for the public	Release not required	To be released immediately	Release not required	Release not required
Exit access door and/ or exit door to rooms not in the escape path for the public.	Release not required	Release not required	Release not required	Release not required

Note:

* Excluding faults on other access control devices such as card readers, override key switches, non-emergency exit buttons, etc.

** Electromagnetic/ Electromechanical locking device can be manually re-engaged after it has been released, provided such a device complies with the following:

(1) There is no activation of any fire detection system and it has been visually verified that there is no fire; and

(2) A device to re-engage the Electromagnetic/ Electromechanical locking shall be provided at the PSC or OCC, if PSC is not available.

Diagram 4.2.4j.(3): Pictogram signage for Fire Engine Accessway/ Fire Engine Access

TABLE 4.4.2: WATER SUPPLY & STORAGE REQUIREMENT FOR PRIVATE FIRE HYDRANT		
Minimum running pressure	2 bars	
Minimum duration	45 mins	
Minimum flow rate	Accessible Floor Area* (m^2)	Minimum flow rate
	$\leq$ 1000m^2	38 L/s
	>1000m^2 and $\leq$ 5000m^2	57 L/s
	> 5000m^2	76 L/s
Note: * - Based on the Accessible Floor Area (AFA) of the largest compartment in the station		

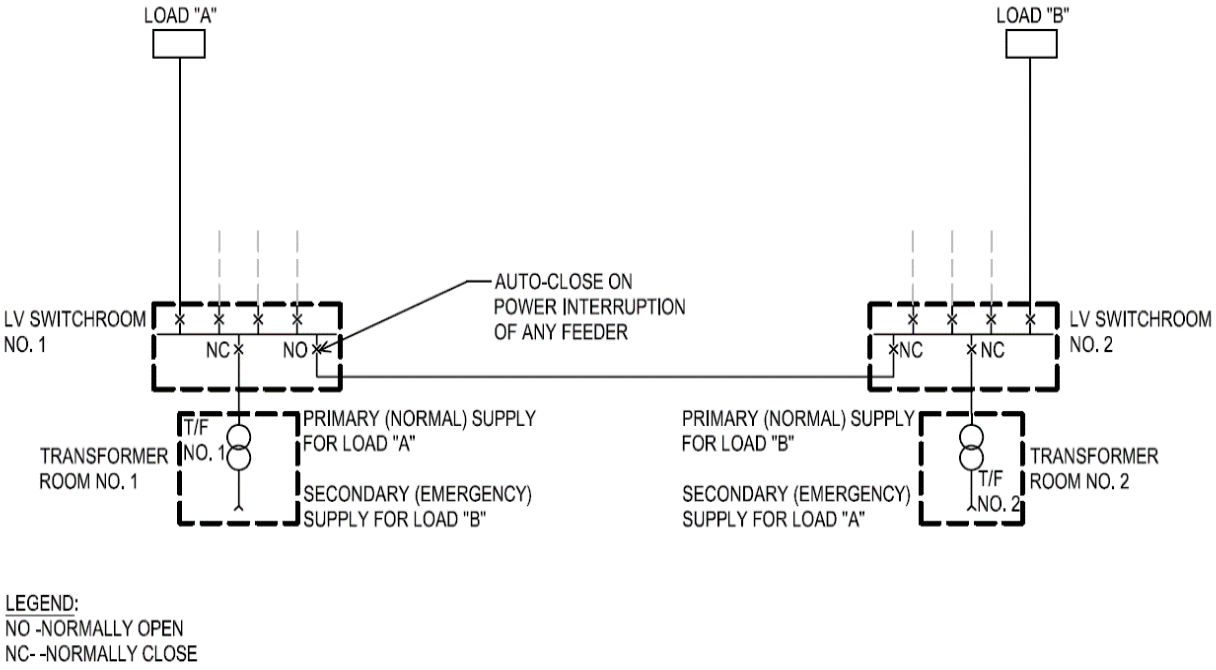


Diagram 5.2.6 – 1: Block diagram of Typical RTS Station Dual Feeder LV Power Supply Scheme

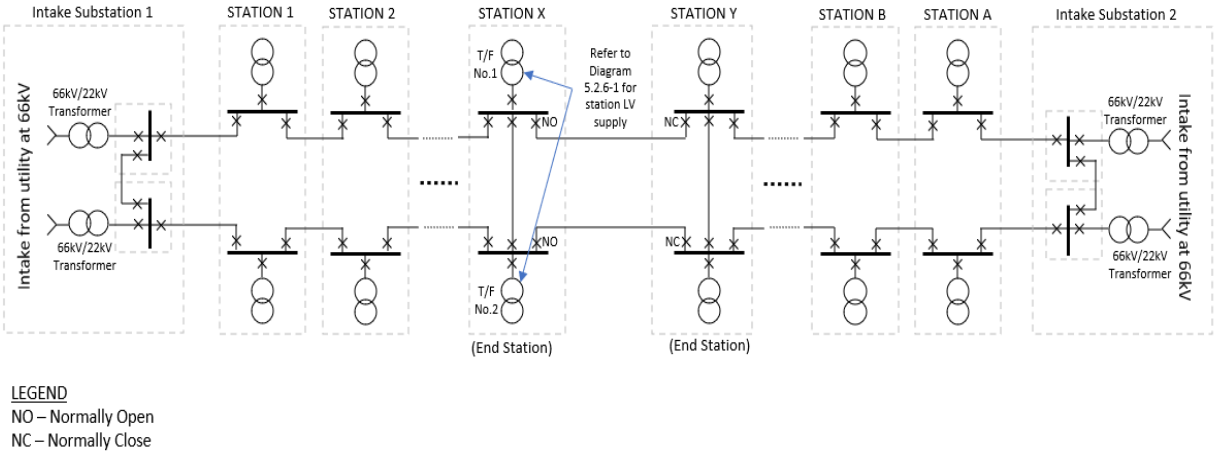


Diagram 5.2.6 – 2: Block diagram of Typical RTS Station Dual Feeder HT Power Supply Scheme

Table 6.4A COMPARTMENTATION AND FIRE PROTECTION REQUIREMENTS					
Usage (1)	**Non-sprinkler-protected station (2)**		**Sprinkler-protected station (3)**		
	Compartmentation (2a)	**Door rating (2b)**	**Compartmentation (3a)**	**Door rating (3b)**	**Sprinkler (3c)**
Store room	1-hr	1-hr	N	N	S
AHU room	N	N	N	N	S
Low voltage switch room	2-hrs	2-hrs	2-hrs	2-hrs	EX
High voltage switch room	2-hrs	2-hrs	2-hrs	2-hrs	EX
Transformer room (1)	2-hrs	2-hrs	1-hr	1-hr	S
Fuel/ Oil tank room	4-hrs	4-hrs	4-hrs	4-hrs	S
Generator room	4-hrs	4-hrs	4-hrs	4-hrs	S
Electric lift motor room (2)	2-hrs	2-hrs	2-hr	2-hrs	EX
Hydraulic lift motor room (2)	2-hrs	2-hrs	2-hr	2-hrs	S
Battery room (13)	2-hrs	2-hrs	2-hr	2-hrs	S(12)
Fire pump/ tank room	2-hrs	2-hrs	2-hr	2-hrs	S
Fire command centre	2-hrs	2-hrs	2-hr	2-hrs	S
MDF room, PABX room	N	N	2-hr	2-hrs	EX
			N	N	S
Public toilet (3)	N	N	N	N	S
Commercial space	2-hrs	2-hrs	1-hr	1-hr	S
Ticket vending machine room (3)	N	N	N	N	EX
Passenger Service Centre (PSC) (3)	N	N	N	N	EX
Station Manager Room (SMR) (3)	N	N	N	N	S (11)
Ticket sales office (3)	N	N	N	N	S
General purpose office (4)	N	N	N	N	S
Staff room (4)	N	N	N	N	S
Staff toilet/locker room (4)	N	N	N	N	S
Maintenance office (4)	N	N	N	N	S
Bin centre (5)	2-hrs	2-hrs	2-hrs	2-hrs	S
Tunnel ventilation fan room (6)	2-hrs	2-hrs	2-hrs	2-hrs	EX
ECS plant room	2-hrs	2-hrs	2-hrs	2-hrs	S
Electrical room	2-hrs	2-hrs	2-hrs	2-hrs	EX
Electrical closet	N	N	N	N	EX
Essential fan room (7)	2-hrs	2-hrs	2-hrs	2-hrs	S
Uninterruptible power supply room	2-hrs	2-hrs	2-hrs	2-hrs	EX
Pneumatic platform screen door room	2-hrs	2-hrs	2-hrs	2-hrs	S
Underplatform Services Duct (8)	2-hrs	2-hrs	2-hrs	2-hrs	EX
Civil defence room with storage	2-hrs	2-hrs	N	N	S
Civil defence room without storage	N	N	N	N	EX
Supply air shaft (9)	2-hrs	2-hrs	2-hrs	2-hrs	--
Exhaust air shaft (9)	2-hrs	2-hrs (10)	2-hrs	2-hrs (10)	--

Table 6.4A COMPARTMENTATION AND FIRE PROTECTION REQUIREMENTS – CONTINUED (2)					
Usage (1)	**Non-sprinkler-protected station (2)**		**Sprinkler-protected station (3)**		
	Compartmentation (2a)	**Door rating (2b)**	**Compartmentation (3a)**	**Door rating (3b)**	**Sprinkler (3c)**

Note:

Essential equipment includes communication equipment, signalling equipment, uninterruptible power supply/emergency power supply charger/rectifier and HV/LV switchgears which are critical for the operation of trains, the emergency fire safety equipment, and the emergency evacuation of commuters.

EX Sprinkler system is exempted from the corresponding area provided that the area is fitted with an automatic fire alarm system installed according with *SS 645*

N No specific requirement on compartmentation

S Sprinkler system has to be extended into such rooms

(1) 4-hr compartmentation if flammable liquids are used. Refer to *Cl.3.2.4g.(1)*

(2) Openings for ropes and cables shall be kept as small as practicable

(3) Wall/door separating the room and non-public area shall have at least 2-hr fire rating

(4) Wall/door separating the room and public area shall have at least 2-hr fire rating

(5) Compartmentation and sprinkler protection are not required if it is a stand-alone structure i.e. not adjoining or below transit structure(s)

(6) Motorised dampers separating the room and the trainways need not have fire rating

(7) Except as modified in *Cl.6.4.2c*.

(8) The underplatform services duct (UPSD) shall also be divided longitudinally into two sections by a 2-hour fire-rated wall so that the two electrical feeders carrying electrical power supply for the RTS system are physically separated

(9) No detectors are required in these air shafts

(10) The door shall also be a smoke check door

(11) Sprinkler is exempted where SMR meets the requirements of *Cl.6.4.1d.*

(12) Water mist system can be considered in lieu of conventional automatic fire sprinkler system.

(13) This requirements of compartmentation shall apply to any room that is designated as a battery room or Threshold Stored Energy exceeded the limits stated in *Cl.10.3.1e.* of the Code of Practice for Fire Precautions in Buildings. This does not apply to battery used in consumer products such as laptop, phone, etc.

TABLE 7.1.16: TYPES OF PERMITTED SERVICES ROUTED IN AIR SHAFTS	
VENTILATION SUPPLY (VS) SHAFT	
1	Breeching inlet pipes for fire protection system.
2	Water metal pipes for domestic/ CD water supply, hydrant, and sprinkler.
3	Condenser water supply and return, condensate recovery metal pipes for aboveground cooling towers.
4	Water metal pipes for feed & expansion tank and cooling tower make up water tank.
VENTILATION EXHAUST (VE) SHAFT	
1	Sanitary waste and vent metal pipes (ejector and inspection chambers)
2	Pump drainage metal pipes
3	Fuel and vent pipes (in fire-rated enclosure) for day and bulk tank (for CD station only)
4	CD generator insulated exhaust metal pipes (for CD station only)
5	Low smoke zero halogen (LSOH) fire resistant or LSOH flame retardant earth cables for fuel inlet earth bar (for CD station only)
6	Non-flammable insulated refrigerant metal pipes and LSOH fire resistant or LSOH flame retardant cables for split air-conditioning units
7	LSOH fire resistant or LSOH flame retardant power & control cables for aboveground cooling towers
8	LSOH fire resistant or LSOH flame retardant power cables for mobile genset connection
9	Communication LSOH fire resistant cables running in metal conduits or trunkings for firefighter's intercom.
10	LSOH fire resistant or LSOH flame retardant power cables for battery room
11	Insulated chilled water supply and return metal pipes